OPPORTUNITY COSTS OF TRADE-RELATED CAPACITY DEVELOPMENT IN SUB-SAHARAN AFRICA

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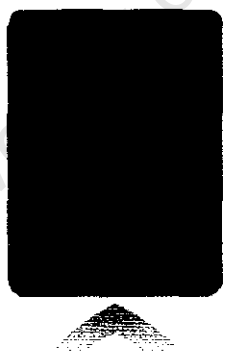

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Abstract

Recent studies have documented the impact of institutions and infrastructure development on trade flows. This paper studies these issues in the context ofongoing trade-related capacity building initiatives and evaluates the opportunity cost of different trade-related capacity building policy mixes. Trade-related technical assistance and capacity building was recognized in 2001 bythe World Trade Organisation Doha Ministerial Declaration as a core element of the development dimension of the multilateral trading system and commitments were set out in those areas. The extentof trade-related technical assistance and capacity building to help developing and least-developed countries participate more efficiently in international trade has increased by 50% between 2001 and 2004. The purpose of this thesis is to address the question of whether the weights assigned to different components of trade-related capacity building in existing trade-related capacity building programmes are economically justified. To do this the paper evaluates the opportunity costsof different trade-related capacity building policy mixes with specific reference to Sub-Saharan Africa, excluding South Africa. We use a number of variables from both theoretical and empirical literature to come up with composite indicators for trade-related institutions, infrastructure and human capital. The analysis is also informed by interviews with trade experts in Geneva as well as a review of relevant background documents.

In the empirical analysis we use 2005 trade patterns for a data set of 117 countries of which 24 are in sub-Saharan Africa. Making use ofa gravity equation augmented with trade-related capacity building variables we run a series of Heckman's two-step selection regressions and estimate the marginal impactsof these trade-related capacity building indicators on trade as measured by value of total exports. To evaluate opportunity costs, we do policy simulations and estimate how much trade flows will be increased under various policy scenarios with respect to improved trade-related capacity building indicators in Sub-Saharan Africa. We examine scenarios that focus on improved institutions, infrastructure and human capital as they move in the direction of comparability with the rest of the world. The world's average level is used as the baseline for each of these composite indicators in the policy simulations.The results show that trade flows exhibit different levels of sensitivity to different trade-related capacity building policy options with the exporter's infrastructure being the most significant with an average elasticity of approximately 3.0. The findings also suggest that complementing improvements in the quality of human capital and infrastructure will provide the greatest bilateral trade flow benefit to Sub-Saharan Africa; while non-Sub-Saharan Africa countries gain the most from complementing infrastructure and institutions. Such a finding contradicts the current focus ofongoing TRCB programmes that put emphasis on human capital development only.

Building on both Grossman and Helpman (1991)'s trade model and Barro (1990) s' growth model, the paper argues that the theoretical propositions are inadequate to address the dynamics associated with trade-related capacity buildingpolicy. The paper further argues that analyzing the impact ofTRCB using these standard frameworks underestimates the impact since policy dynamics are not addressed in that framework. This could

contribute to explaining why there has not been consensus in the trade-growth empirical literature, with some authors finding a positive and significant impact of trade on growth, while others argue that the impact is not significant. Hence, the paper proposes improvements in the specification of the standard growth model to take into account policy dynamics,specifically assumptions regarding substitutability among TRCB investments.

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World Trade Organisation gave me the opportunity through the WTO PhD Programme to travel to Geneva, Switzerland and spent time interviewing trade experts and familiarising myself with the WTO work – special thanks goes to Robert Teh Jr, his mentoring was indispensable. And of course special mention goes to all the trade experts based in Geneva who provided me with invaluable insights into the trade-related capacity building activities.

Above all, I want to thank my God the Almighty who moved the hearts of many to provide me with the right kind of support at the right time. Today when I look back I can only say Thank You God you have been so faithful and good to me. I receive this doctorate degree with so much humility, because I acknowledge that it is only God who did it, many times I wanted to quit but something kept on pushing me right from inside.

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List of Abbreviations and Acronyms

AC	Andean Community
ACP	Africa, Caribbean and Pacific
ADI	African Development Indicators
AGOA	African Growth and Opportunity Act
APEC	Asia – Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
ASYCUDA	Automated System for Customs Data
AU	African Union
A4T	Aid for Trade
CACAM	Central American Common Market
CARICOM	Caribbean Community and Common Market
CBTs	Computer based training modules
CE	Custom Environment
CEFTA	Central European Free Trade Agreement
CES	Constant Elasticity of Substitution
CIA	Central Intelligence Agency
CIDA	Canadian International Development Agency
CIS	Commonwealth Independent States
CDF	Communication and Discussion Facilities
CGE	Computable General Equilibrium
COMESA	Common Market for Eastern and Southern Africa
COMTRADE	Commodity and Trade Database
CTFSG	Common Trust Funds Steering Group
DAGTF	Development Agenda Global Trust Fund
DDA	Doha Development Agenda
DIST	Geographical Distance between Capital Cities

DTIS	Diagnostic Trade Integrated Studies
ECA	European Commission for Africa
EC	European Union Commission
EFTA	European Free Trade Association
ECOWAS	Economic Community of Western African States
ESSA	Economic Society of South Africa
EU	European Union
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FYRITDP	Five Year Regional Integrated Trade Development Programme
GAFTA	Greater Arab Free Trade Area
GATT	General Agreement on Tariffs and Trade
GCR	Global Competiveness Report
GDP	Gross Domestic Product
GNP	Gross National Product
GNPPC	Per Capita Gross National Product
GMP	Good Manufacturing Standards
HACCP	Hazard Analysis Critical Control Point System
HIV/AIDS	Acquired Immune Deficiency Syndrome
H–O	Hecksher – Ohlin
HOV	Hecksher – Ohlin – Vanek
IF	Integrated Framework
IFTRTA	Integrated Framework for Trade Related Technical Assistance
ILEAP	International Lawyers and Economists against poverty
IMF	International Monetary Fund
ITC	International Trade Centre
ITF	International Trade Forum
ITTC	Institute for Training and Technical Cooperation

IOM	International Migration
ISO	International Organization for Standardization
ISP	Internet Service Providers
JITAP	Joint Integrated Technical Assistance Programmes
LDC	Least Developed Countries
LMIC	Low and Middle Income countries
MCCBP	Multi Country capacity building programmes
MCDPM	European Centre for Development Policy Management
MERCOSUR	Southern Common Market
MTN	Multilateral Trade Negotiations
MTS	Multilateral Trading Systems
NAFTA	North America Free Trade Agreement
NEPAD	New Economic Partnerships for Africa Development
OECD	Organization of Economic Cooperation and Development
OIEC	World Organization for Animal Health
PRSPs	Poverty Reduction Strategy Papers
PE	Port Efficiency
PPPs	Private – Public Partnerships
R & D	Research and Development
RE	Regulatory Environment
RTPCs	Regional Trade Policy Courses
RTA	Regional Trade Agreements
SACU	Southern Africa Customs Union
SSA	Sub Saharan Africa
SAPTA	South Asia Preferential Trade Agreement
SI	Service Sector Infrastructure
SME	Small and Medium Enterprises
STDF	Standards and Trade Development Facility

STPCs	Short Trade Policy Courses
TACB	Technical Assistance and Capacity Building
TAMC	Technical Assistance Management Committee
TCBD	Trade Capacity Building Database
TCD	Trade Capacity Development
TDS	Trade Development Strategy
TD	Trade Development
TFP	Total Factor Productivity
TRAINS	Trade Analysis and Information Systems
TPCs	Trade Policy Courses
TPR	Trade Policy Reviews
TPR	Trade Policy and Regulations
TRCB	Trade Related capacity building initiatives
TRTA	Trade – Related Technical Assistance
TRI	Trade – Related Institutions
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECFA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organization
USA	United States of America
USAID	United States Agency for International Development
UR	Uruguay Round
WB	World Bank
WDI	World Development Indicators
WEF	World Economic Forum
WHO	World Health Organization
WTO	World Trade Organization
WWII	World War II

CHAPTER 1

BACKGROUND AND INTRODUCTION

1.1 INSTITUTIONAL BACKGROUND AND INTRODUCTION

The inception of the Uruguay Round (UR) of multilateral trade negotiations in 1986 and the formation of the World Trade Organization (WTO), which came into force on January 1, 1995, transformed international trade policy, which is now increasingly determined through multilateral and bilateral negotiations and trade agreements. This has made it difficult for developing countries to integrate into the world economy due to their inadequate capacities to negotiate, and formulate effective strategies and trade policies and also due to their weak institutions. Even though the multilateral trading system offers opportunities to developing countries, these countries need to overcome many challenges and problems before they can derive maximum benefits from the system. For instance, after signing the Uruguay Agreement in 1994, a number of developing countries realized that some of the obligations they had signed on to (e.g., liberalization of access to financial markets, simplification of customs books, etc.) were complex and beyond their immediate implementation capacities. The complexity of the issues developing countries have to deal with in their participation in the MTS requires that they develop the capacity to understand these issues and articulate their interests at negotiation forums. Hence, according to Solignac Lecomte (2001:10) 'trade related challenges have become more visible over the last few years' as many developing countries, including most of those in the African, Caribbean and Pacific (ACP) group, have confirmed their lack of resources to meet the challenges of both international trade liberalization and participation in a multilateral trade system (Solignac Lecomte, 2001). Prominent among the kinds of missing resources have been expertise for conducting negotiations and implementing obligations (human capital), institutions for overseeing newly required systems of monitoring and enforcement, and infrastructure at and around points of export and import for inspection, discovery and processing of records.

According to ILEAP (2006), for developing countries to benefit from market access opportunities emerging from trade negotiations there should be policy reforms and significant investments in infrastructure, training and institutional development. It is not surprising, therefore, that trade-related capacity building (TRCB) has increasingly gained the attention of both recipient and donor countries (Delin and Vodusek, 2004). There has been an increase in demands for trade related technical assistance by developing countries from international agencies and the donor community as evidenced by the following requests:

- The African Trade Ministers, at their meeting in Tunis in 1994, formally requested trade-related technical assistance[1] from the international community;
- In 1999 the Government of Senegal approached the Canadian International Development Agency (CIDA) for support in developing a trade and investment strategy;
- Ghana, also in 1999, requested the UK's assistance in a trade related project;
- The Indian Ocean Commission asked the European Union (EU) to continue the support granted under its Five Year Regional Integrated Trade Development Programme (Solignac Lecomte, 2001);
- Developing countries insisted that technical assistance for implementation be included in the agenda for the Doha Development Round of WTO negotiations launched in 2001.

While developing countries have been increasingly requesting TRCB, the donor community has also been acknowledging the importance of building trade-related capacity in developing countries. Especially since Uruguay, donors have been eager to consolidate the multilateral trade system by enhancing participation of and stimulating benefits for its poorest members. In support of this policy shift there has been a surge in TRCB activities as evidenced by the inception of the following programmes:

- Joint Integrated Technical Assistance Programmes (JITAP) – This was initiated at the UNCTAD IX conference in 1996, in response to the request for technical assistance by African Trade Ministers.
- Integrated Framework (IF) –This was inaugurated in 1997 and is jointly managed by the WTO, UNCTAD, the World Bank, the International Monetary Fund, the International Trade Centre and the United Nations Development Programme.
- European Union Commission (EC) TRCB – Though the EC has been providing technical assistance since the 1960s, in 2000 there was a turning point in its focus when trade was identified as one of the six priority areas for development policy.
- Asia-Pacific Economic Cooperation (APEC) –APEC has been a supporter of the WTO and commits its members to free and open trade and investment in the region. The majority of its projects are managed and funded bilaterally.
- World Trade Organisation (WTO) – WTO ministers agreed at Singapore in 1996 on a Plan of Action for Least Developed Countries. This included technical cooperation to enable them to participate better in the multilateral trading system. The WTO mandate to carry out technical cooperation activities is provided for in various WTO agreements and decisions.
- The agenda of the current Round of multilateral trade negotiations, the Doha Development Agenda (DDA), devotes significant attention to capacity building[2]. The emphasis of the DDA is on assisting developing countries to integrate fully into the multilateral trading system. In 2001 the Doha

[1] Available at http://www.jitap.org/info-e.htm (accessed 19/02/2009).

[2] World Trade Organisation, Doha Declarations (paragraphs 38, 39, 40 and 41)

Development Agenda Global Trust Fund was established. It relies on voluntary contributions by members to finance technical assistance in trade-related activities.

The rise ofTRCB as a key element of international integration in least developed countries has posed a fundamental challenge to research on the subjects.

1.2 THESIS OBJECTIVE AND MOTIVATION

This thesis therefore aims to investigate the opportunity costs of different trade-related capacity building (TRCB) policy mixes in sub-Saharan Africa (SSA). The thesis follows the WTO/OECD definition ofTRCB which includes 'support to: (a) formulate and implement a trade development strategy; (b) increase and diversify exports and markets; and (c) participate in institutions and processes that shape national and international trade rules and practices' (Weston, Blouin and De Silva, 2005). This definition encompasses Trade Policy and Regulations (TPR), and Trade Development (TD)[3]. Solignac Lecomte (2001:10) concisely defined trade capacity development 'as technical and financial assistance granted by donor agencies to improve developing countries' capacity to trade internationally'.

It is well documented in the development literature that Africa not only lags in development compared to the rest of the world but is also marginalised from the multilateral trading system (MTS), (Collier, 1995; Ng and Yeats,1997). Its share of world exports has declined over the past twenty years from about 4.1 percent in 1980 to about 1.6% in 2000. At the same time its share of world imports declined from 3.2 percent to 1.3 percent (IMF's World Economic Outlook). A major challenge for policy makers has been to identify possiblemeasures which might rapidly integrate Africa into the mainstream ofthe world economy so as to foster growth and reduce poverty. According to Easterly (2001) economists have recommended and tried policies that range from foreign financial capital provision to investment in machines; from fostering education to controlling population growth; from giving loans conditional on policy reforms to giving debt relief conditional on institutional reforms. However none of these policies has delivered as promised and some of them have been faced with repeated failures. In the last 25 years expansion of trade has become an increasingly important strategic objective for developing countries and there has been a renewed interest in global integration; hence the new focus on TRCB - the broad objectiveof whichis tointegrate developing countries into the multilateral trading system. There is a general belief that trade provides the best conditions for economic development and growth. Therefore, if a country is not well integrated into global economy it becomes marginalised in terms of development and growth. This is

[3] TPR covers support to aid recipients' effective participation in multilateral trade negotiations, analysis and implementation of multilateral trade agreements, trade policy mainstreaming and technical standards, trade facilitation including tariff structures and customs regimes, support to regional trade arrangements and human resources development in trade. TD covers business development and activities aimed at improving the business climate, access to trade finance, and trade promotion in the productive sectors (agriculture, forestry, fishing, industry, mining, tourism, services), including at the institutional and enterprise level. (tcbdb homepage, available at http://tcbdb.wto.org/publish/2006%20Joint%20Report.pdf, accessed 21/04/2009).

a main reason for all the interest recently given to trade-related capacity building, also referred to as Aid for Trade in the trade policy discussions.

The 2001 WTO Doha Ministerial Declarations (paragraphs 38, 39, 40, and 41) recognized trade-related technical assistance and capacity building as core elements of the development dimension of the multilateral trading systemand set out commitments in those areas. Since then, there has been an increase in attention to these issues by both recipient and donor countries. This growing interest is evidenced by a surge in resources directed towards Trade-Related Capacity Building (TRCB) initiatives, though areas of focus differ across donors. Although not generally conceptualized by policy designers in these terms, in the categories of recent development theory in economics, these initiatives have generally involved investment in one or more of human capital, infrastructure and institution building. As such, TRCB is broadly defined as a coherent set of activities by donors and partner countries designed to improve trade performance through institutional, human capacity and infrastructural development. According to the WTO/OECD Joint Report (2005), since the Doha declaration resources allocated to TRCB have increased by 50% (albeit off a very low base). However, despite the increasing importance ofTRCB, little research has been done to evaluate the opportunity cost of different TRCB policy mixes. Hence, this study is motivated by the need to provide a scientific basis for refining trade-related capacity building policy. Sub-Saharan Africa receives special attention in this thesis because its underdevelopment compared to the rest of the world and its marginalization from the multilateral trading system render it at once the most urgent and the most challenging target for TRCB initiatives.

However, Collier and Gunnning (1999) argue that Africa's problem of slow growth is due to the influence of a few variables measuring environment and institutions. The factors cited as causing slow growth are lack of social capital, lack of openness to trade, deficient public services, geographically generated risk, lack of financial depth and high aid dependence. The authors argue that social institutions that cause growth are underdeveloped in Africa. Collier and Gunning support Rodrik's (1998) argument that the decline in Africa's share of world trade reflects Africa's relatively poor economic performance.This argument is based on the fact that trade flows as a share of GDP in Africa have risen and are reasonably high compared to other countries. If it is true that low economic growth is the source of the main constraints on trade in Africa, are true, then a focus on TRCBprograms that facilitate trade may be ineffectual. In that case, policies that complement both growth and trade may be preferable.

The following research questions will be interrogated in detail: Is TRCB policy theoretically and empirically informed? Are the weights assigned to different components of trade-related capacity building activities in existing TRCB programmes economically justified? To what extent will participation in the MTS be enhanced by TRCB? Given the fact that more resources for TRCB imply fewer for other development programmes, what is the opportunity cost of investing resources in one particular TRCB approach as

opposed to another? To adequately investigate these TRCB issues the thesis is organized around the following three main themes:

- a critical evaluation ofTRCB implementation, choice of instrument and institutional perspective ofTRCB;
- economic analysis ofthe effects ofTRCB on trade (taking into account opportunity costs) and;
- implications of empirical findings for growth models.

A number of variables from both theoretical and empirical literature are used, to come up with composite indicators for trade-related institutions, infrastructure and human capital. For the empirical analysis, the thesis makes use ofan augmented gravity model to estimate the impact of these TRCB indicators on trade as measured by value of total exports. The thesis then estimatespotential increases in trade flows under various policy scenarios with respect to improved TRCBcontributions in SSA. In this regard, an examination of scenarios that focus on improved institutions, infrastructure and human capacity as they move in the direction of comparability with the rest of the world is carried out. The world's average level is used as the baseline for each of these composite indicators in policy simulations.

1.3 STRUCTURE OF THE THESIS

This section gives a short description of the contents and main results ofthe thesis. It consists of four chapters including this Chapter 1, "Background and Introduction", which introduces TRCB issues, highlights the objective of the thesis and provides its motivation.

Chapter 2, "A Critical Evaluation Of Trade-Related Capacity Building Programmes", establishes a background understanding ofTRCB by defining it, analysing its theoretical foundations and giving an overview ofTRCB policy papers and other related previous work on infrastructure, institutions and trade. The chapter also outlines agency bureaucrats' views on TRCB. In addition, the chapter reviews the extent ofTRCB activities by both bilateral and multilateral donors, based on both interview work and desk study. The review highlights the fact that there are a wide range of specific TRCB products on offer in developing countries and donors do not focus their efforts exclusively on one kind ofTRCB initiative. The overview ofTRCB activities in this chapter shows some inconsistencies in institutional response to TRCBpriorities.

Chapter 3, "measuring the opportunity costs of trade-related capacity development in sub-saharan Africa" presents economic analysis of the effect ofTRCB on trade and the opportunity costs associated with mixes ofTRCB contributions. The data (sources, definitions, and construction ofTRCB indicators) used in this thesis are discussed in detail in this chapter. The theoretical foundations ofthe gravity model I will use for trade analysis are also discussed. Special attention is given to specification and sample selection bias issues, and to how these issues have been addressed in recent empirical literature. The gravity

model is estimated using the Heckman two-step selection approach to analyze the marginal effects ofTRCB indicators on trade as measured by value of total exports. Regressions are run for different sub-samples to test different hypothesis and to test the validity of the obtained results. Making use of estimated results from the standard gravity equation, the chapter also provides an analysis of different TRCB policy mixes and their likely benefits. The impact is examined through simulation of three main policy approaches. The main finding of the analysis is that complementarities among objectives matter in trade-related capacity building initiatives. More specifically, to get the greatest boost of SSA's bilateral trade flows, a policy mix that targets complementary improvement of human capital and infrastructure should be adopted. Thus emphasizing human capital development alone (which seem to be the main focus of existing TRCB initiatives) at the expense of improvement in infrastructure in SSA will not bring about the greatest benefit. Findings from the empirical analysis contradict patterns revealed during the critical evaluation ofTRCB programmes in Chapter 2 which showed absence of clear coordination and coherence ofTRCB activities necessary for promoting complementarities. What we see is an ad hoc implementation of TRBC initiatives by different implementing agencies

Chapter 4, "implicationsof trade-related capacity building on overall development" uses growth modeling to expand the depth of policy relevance of preceding chapters. The chapter tests the implicationsofthe preceding findings with respect to impactsofTRCB initiativeson growth, and argues that the standard growth models are inadequate to address the dynamics in trade-related policy. Growth modeling is introduced to show how complementarities also have a growth impact in addition to a positive impact on trade flows (as empirically established in the previous chapter). The thesis then proposes ways of extending growth models to take into account the empirical findings in this thesis. The theoretical framework is derived from Barro (1990) and forms the basis for the analysis. The chapter concludes that analyzing the impact ofTRCB using the standard endogenous growth framework might underestimate the impact since policy dynamics are not addressed in the framework – which could be the reason for the existence of ambiguities that have been noticed in the trade-growth empirical literature. The chapter also presents the final conclusions and policy recommendations, and proposes areas for future research.

CHAPTER 2

A CRITICAL EVALUATION OF TRADE-RELATED CAPACITY BUILDING PROGRAMMES

2.0 INTRODUCTION

Before evaluating opportunity costs ofTRCB, it is necessary to understand what it is, its theoretical foundations, the current major programmes that are being implemented and what informs them, and implementers' (bureaucrats') views regarding their intended objectives. This chapter will therefore critically survey these issues. The chapter is organised as follows. Section 2.1 defines TRCB. Section 2.2 reviews its theoretical foundations. Section 2.3 surveys the empirical literature related to TRCB. Section 2.4 gives a background analysis ofTRCB programmes, along with a critical evaluation of the major programmes, JITAP and the Integrated Framework. Section 2.5 concludes the chapter by highlighting major issues that emerged from interviews with trade officials in Geneva and study of policy documents.

2.1 DEFINITION OFTRCB

According to the WTO/OECD,TRCBis defined to include 'support to: a. formulate and implement a trade development strategy; b. increase and diversify exports and markets; and c. participate in institutions and processes that shape national and international trade rules and practices' (Weston, Blouin and De Silva, 2005). This definition encompasses Trade Policy and Regulations (TPR), and Trade Development (TD). 'TPR covers support to aid recipients' effective participation in multilateral trade negotiations, analysis and implementation of multilateral trade agreements, trade policy mainstreaming and technical standards, trade facilitation including tariff structures and customs regimes, support to regional trade arrangements and human resources development in trade. TD covers business development and activities aimed at improving the business climate, access to trade finance, and trade promotion in the productive sectors (agriculture, forestry, fishing, industry, mining, tourism, services), including at the institutional and enterprise level'[4].

Another term that has dominated trade policy discussion platforms in recent years, which is used interchangeably with TRCB, is Aid for Trade (A4T). The WTO Task Force on A4Tdefined it as comprising six categories: '(a) trade policy and regulations; (b) trade development; (c) trade-related infrastructure; (d) building productive capacity; (e) trade-related adjustment; and (f) other trade-related needs' (OECD, 2007:7).

Given that least developed countries, which are the target beneficiaries ofTRCB, are not homogenous in terms of development characteristics, their specific TRCB needs differ widely. Effective TRCB efforts

[4] (Tcbdb homepage, available at http://tcbdb.wto.org/publish/2006%20Joint%20Report.pdf, accessed 21/04/2009)

should therefore reflect these differences, and a wide variety of initiatives should ideally be offered. The joint WTO/OECD Trade Capacity Building Database (TCBDB), which maintains details and funding levels ofTRCB initiatives, lists almost 15000 activities for the period 2001 to 2005, provided by more than 40 bilateral and multilateral donors. Given this diversity ofTRCB activities it is difficult to come up with one common accepted definition ofTRCB, since it means different things to different donors and in different recipient countries. Solignac Lecomte (2001:10) concisely defined trade capacity development 'as technical and financial assistance granted by donor agencies to improve developing countries' capacity to trade internationally'. According to OECD (2001:22) there seems to be confusion among donors on what trade capacity building means, as some donors do not isolate their direct trade capacity building programmes from other activities that indirectly affect trade. Furthermore, evolution of new negotiation issues means also that trade capacity needs are ever changing (Solignac Lecomte, 2003).

This thesis categorises all the TRCB activities as a coherent set of activities by donors and partner countries designed to improve trade performance through institutional, human capacity and infrastructural development. This would be an appropriate definition for taking into account the diverse nature ofTRCB activities. Also, implicit in this conception is the idea that partial or piecemeal approaches to TRCB that are not coordinated and do not explicitly take into account the importance of policy complementarities will fail to stimulate trade or growth. This also goes beyond trade facilitation (which has dominated empirical literature in recent years), which focuses on factors affecting mere movement of goods across borders.Considering supply-side capacity is in the spirit of the Hong Kong Declaration which recognized the need for countries to address supply side capacity and trade-related infrastructure before realizing benefits from WTO agreements (WTO, 2005)[5].

2.2 THE THEORETICAL FOUNDATIONS OFTRCB

TRCB issues find their theoretical underpinning in the framework for modelling trade and growth. Although most programme documents do not explicitly describe the theoretical basisof their TRCB activities, implicitin all initiatives is the demand and supply trade theory, whereby the liberalized multilateral trading system is seen as presenting an opportunity (demand) for developing countries to expand (supply). Trade capacity development is therefore seen as an instrument through which developing countries can increase their ability to supply theincreasing demandoffered by the MTS.

Over the years, much of the debate on trade and growth has centred on the links between trade liberalization (openness) and growth and between trade liberalization and income convergence among countries. These relationships have been central to development theory and also have long been

[5] Paragraph 57 of the Hong Kong Declaration.

recognized in public policy debates. The outward orientation adopted by SSA countries in the 1980s and 1990s was premised on this widely accepted view that openness was positively linked with growth. The academic literature gives us a variety of stories about how trade affects growth. These stories do not contradict each other but they do emphasise different mechanisms. The origins of the theoretical literature on trade and growth lie in the classical models of absolute and comparative advantage, as well as the Hecksher-Ohlin model and its refinements (Jayme 2001). Economists since Adam Smith have held, based on both theoretical arguments and empirical measurement, that free trade between any two countries is beneficial to both; hence, the idea of economic integration is about exchange or trading for mutual benefits in a global economy. Smith argued that if a country specializes in the production and exchange of a good in which it has an absolute advantage, that country could benefit by trading with a country that has an absolute advantage in the production of something else. The benefits would be that both countries could consume more of both goods for the same level of inputs as before trade.

David Ricardo did not object to Smith's analysis but argued that countries that do not have any absolute advantages in productive efficiency can still benefit from free trade. He showed, usinga simple model, that total outputs oftwo countries' goods can be increased if both specialize according to their patterns of*comparative* advantage. His argument is that 'trade offers each country the opportunity of specializing in the production of the good in which it has the comparative advantage and then exchanging some of this production for the good in which it has the comparative disadvantage. Both countries can reallocate their labour to the line where their comparative advantage lies, export this good and import the other. In short, with a given amount of labour resources each country can consume more by trading than in isolation. This possibility is referred to as the *gains from trade*. 'The doctrine of comparative costs maintains that if trade is left free each country in the long run tends to specialise in the production of and to export those commodities in whose production it enjoys a comparative advantage in terms of real cost' (Viner: 438). Thus the Ricardian model of trade theory implies product specialisation as a result of international productivity differences.

Hecksher-Ohlin (H-O) extends Ricardo's insight by identifying differences in factor endowments as the basis of trade. According to the H-O theorem, in a two-country model each country exports the commodity that uses the country's more abundant factor more intensively. 'Theoretically the Hecksher-Ohlin theorem states that a capital-abundant country exports the capital-intensive good. Its generalisation, the Hecksher-Ohlin-Vanek (HOV) theorem, states that a capital-abundant country exports capital services' (Trefler 1995: 129). H-O further argued that if trade is determined by differences in relative factor endowments, then trade must influence prices of the factors of production. This argument led to the Factor-Price-Equalisation Theorem, which states that prices equalize across countries given international mobility of factors. Therefore, countries that engage in international trade improve welfare

and income, and change the income distribution across countries, by means of a best allocation of factors in comparison to autarky (Jayme 2001).

What could be concluded from these traditional theories of international trade is that international trade is the result of differences between countries which give rise to comparative advantage (CEPR, 1994: 16). Empirical studies have however, repeatedly rejected the HOV theorem. Some studies have found that factor endowments correctly predict only about 50 percent of the direction of factor services trade (Trefler, 1995). The first serious attempt to test the Hecksher-Ohlin theorem was by Leontief in 1947 and 1951, using US trade data. He reached a paradoxical conclusion that the US, the most capital abundant country exported labour-intensive commodities and imported capital- intensive commodities. He attributed the unexpected findings to the high efficiency of American workers due to superior institutions and economic incentives[6]. This hypothesis led to the emergence of literature seeking to explain it. The simple trade theory was complicated by adding factors such as tariffs, human capital, knowledge capital, and monopolistic competition (Leamer, 1984: 50-51).

This discontent with the traditional international trade theories gave rise to other models 'which abandoned the toy world of perfect competition and comparative advantage...to construct the theories that acknowledge oligopolies, imperfect competition and economies of scale' (CEPR, 1994: 2). Linder's (1961) income hypothesis predicts that trade in manufacturing goods takes place between countries with similar demand patterns. Recently, similar arguments have been applied to predict that trade is higher between countries with similar institutions, particularly those involving legal and contractual environments, relative to that with and between poor countries (Bardhan, 1992: 1). Bardhan further argues that 'these institutions through their effects on transaction and production costs affect comparative advantage in countries with divergent institutional set-up' (Bardhan, 1992: 1) Therefore, according to this argumentTrefler (1995) 'missing trade' – that is, trade predicted by traditional models that is not observed - finds an explanation in terms of institutional differences between countries, which are directly linked to trade costs.

Other studies have incorporated technological differences among countries in their explanation of trade patterns; for instance Trefler (1995)who incorporated factor-augmenting technology into his model. He resurrected Leontief's theory, and showed that when quality indices of factors are incorporated, the US exported capital and imported labour services in 1947, as predicted by the HOV Theorem. According to Feenstra (1988), technological differences across countries have been found to be important in explaining trade in most empirical work.

[6]Available at http://www.econ.iastate.edu/classes/econ355/choi/leo.htm, last accessed at [19/01/2009]

We now consider how TRCB relates to the existing trade theories and ongoing debates. As noted, standard trade models are based on zero transport costs. They make the assumption that the capacity exists to structurally change the economy as necessary for optimally engaging in international trade; even models that incorporate tariff policies make this assumption. TRCB is potentially relevant because this assumption seldom if ever holds: removal of policy barriers to trade does not necessarily increase trade flows unless other capacity constraints are removed. Therefore, theoretically, the issue of the relative contributions of infrastructure, institutions and human capital development to trade can also find its root in the comparative cost argument, in that these reforms increase the productivity of factors of production, thus influencing a country's comparative advantage profile.According to Paul Krugman, as cited in CEPR (1994), new trade theories offer opportunities to explain dynamic rather than static sources of comparative advantage.

A cursory overview of various trade theories confirms David and Weinstein (2002)'s argument that theory and analysis have so far fallen short of fully specifying the causes and consequences of global trade, as important empirical questions remain unanswered. Due to absence of rigorous test of trade theory, policy analysis becomes highly sensitive to the analyst's priors. In line with this search for alternative explanations of trade, research on trade costs as measured by geography and a set of national differences has also generated a lot of interest recently. The general conclusion has been that trade costs also shape the pattern of trade (Anderson and van Wincoop, 2003a). It has been noted that actual trade is much lower than what a simple gravity model predicts in a frictionless world, motivating Anderson and van Wincoop (2003a) to conclude that this diversion gives evidence of the presence of higher trade costs which are not related to distance. Based on the empirical work recently going on, there seems to be a general consensus that missing trade is mainly due 'to non-tariff barriers to trade, which include transport costs, and other costs related to searching for international suppliers or customers, entering into contracts and shipping the goods and services'.[7](Nordàs and Piermartini, 2004:1)Therefore, discussions on infrastructure, institutions and human capital as determinants of trade find their theoretical justification in trade costs issues. Apart from trade costs, these new trade theories bring in other dimensions of trade, such aspatterns and volume of trade, trade diversification and intra-industry trade among others. One such work, is Melitz (2003) which linkstrade and industry structure and performance, and alsofirm productivity and trade diversification.The authors argues that, as a result of export market entry costs,trade will induce only the more productive firms to enter the export market, while less productive firms continue to produce for the domestic market.The paper goes on show that further exposureto trade reinforces reallocations towards productive firms and results in welfare gains. Thus trade costs affect distribution of gains from trade across different types of firms, withonly the efficient ones reaping

[7] Average applied tariffs on industrial products have declined from 15.5 percent in 1990 to 7.9 percent in 2003

benefits.Thereffore, the authors find, it is possible to see aggregateindustry benefits of trade without seeing any benefit accruing to some individual firms.

2.3 INSTITUTIONS AND IMPLEMENTATION

We closely explore TRCB issues in the following sections. This part of the study is based on four months spent in Geneva studying WTO documents, attending public official meetings and interviewing (both formally and informally) officials of some of the international organizations involved in TRCB. (*See Appendix 1 for a schedule of interviews done.*) The main objective of the exercise was to gain a thorough understanding ofTRCBinstitutions, implementation mechanisms, and specific policy motivations and objectives. The interviews were semi-structured; I developed a guide, which was e-mailed to the informants before interviews, to help direct conversations. *(See Appendix 2.)* The following three sub-sections give a background analysis ofTRCB programmes, a critical evaluation of the major programmes (JITAP and the Integrated Framework), and an overview of specific TRCB activities by major bilateral and multilateral donors. Due to the high volume ofTRCB activities my discussion is not comprehensive or exhaustive; the purpose of the section is to critically review examples.

2.3.1 Background Analysis of Trade-Related Capacity Building Programmes

Any survey ofTRCB literature and interviews will reveal that trade capacity building issues are very diverse, complex and broad in coverage, as they mean different things to different donors and recipients. As noted before, this is not surprising given that developing countries, which are the focus ofTRCB, are far from being homogenous. As such, specific trade capacity needs differ across countries depending on a range of factors such as countries' preferences, their level of development, economic factors and social infrastructure, among others. Such a diversity of trade capacity needs makes it difficult to come up with a single interpretation ofTRCB. This could be reason why the WTO/OECD trade capacity-building database records approximately 15000 trade-related activities provided to developing countries from 2001 to 2005, on both bilateral and multilateral bases (Joint WTO/OECD Report, 2006). These data on trade related activities are easily accessible on the joint OECD-WTO TCBDB database athttp://tcbdb.wto.org/index.aspx?lg=en&/

On the other hand, findings from both interviews and review of relevant official documents revealsa clear principal broad objective ofTRCB programmes to be that of integrating developing countries into the multilateral trading system (Solignac Lecomte, 2001; OECD, 2001; Weston, Blouin and De Silva, 2005; WTO/OECD, 2006). In addition, from the discussions with trade policy makers, it would seem that the focus of trade related capacity building is almost exclusively on building capacities in negotiating and in awareness, processing and use oftrade information.This section of the thesis focuses on critical

assessment of existing TRCB activities by both bilateral donors and multilateral agencies to establish an appropriate basis for their subsequent economic evaluation. A policy initiative should be assessed partly – though of course not exclusively – by reference to outcomes intended by its architects and administrators. Findings from this analysis will also be used to motivate variables and identify proxies for TRCBused in the model specification to be estimated in this paper.

The 2001 WTO Doha Ministerial Declaration recognized trade-related technical assistance and capacity building as a core element of development dimension of the multilateral trading system and set out commitments in those areas. These commitments are spelled out in the WTO Doha Declarations (paragraphs 38, 39, 40, and 41). Since then, the donor community has intensified its efforts to help developing and transition countries participate more effectively in international trade and integrate into the world trading system. According to the Joint WTO/OECD Report, 2006, total commitments ofTRCB by donors increased from US$2004.9 million in 2001 to US$2994.6 million in 2004 (excluding commitments to infrastructure)[8]. Table 1 below shows total commitments to trade policy and regulations, trade development and infrastructure. Infrastructure dominates the volumes ofTRCB commitments in 2005, at 80% of the total. This should not be surprising partly because infrastructural projects (transport and storage, communication and energy) typicallyinvolve largeinvestments(OECD, 2007; WTO, 2006) and all infrastructure activities in the WTO/OECD database were categorised as trade-related. There is a possibility that failure to take into account and isolate non trade-related infrastructure expenditure would result in an overestimation of infrastructure's contribution to TRCB. Activities in the transport and storage sector have been dominating assistance to infrastructure, followed by energy and communication networks. Assistance to infrastructure, TPR and TD shows average annual growth of 4.5%, 2.8% and 6.0% respectively during the period 2001 to 2005. Marked increase in assistance aimed at TD focuses on activities that promote business and trade expansion at both the institutional and enterprise levels – with some of these activities directly aimed at trade promotion while others have other main objectives such as agricultural or industrial development (Joint WTO/OECD Report, 2006:7). By contrast, the sole purpose of TPR is trade promotion.

[8] For detailed information on the programs, see the Doha Development Agenda, Trade Capacity Building Database (http://tcbdb.wto.org)

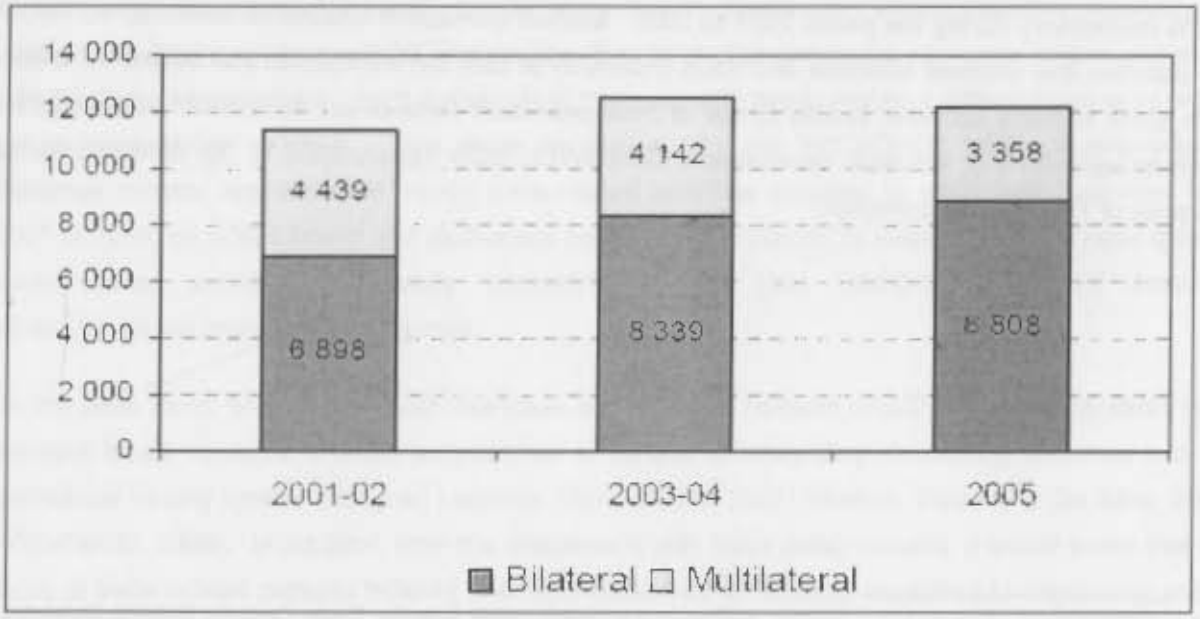
Table 1: Total Commitments to Trade Policy and Regulations, Trade Development and Infrastructure

		2001	2002	2003	2004	2005
Trade policy and regulations	Current US$ million	645	655	919	807	923
	Constant 2004 US$ million	856	820	1 008	807	906
Trade development	Current US$ million	1 360	1 337	2 036	2 153	2 220
	Constant 2004 US$ million	1 797	1 663	2 219	2 153	2 173
Infrastructure	Current US$ million	9 150	9 227	9 344	14 808	12 354
	Constant 2004 US$ million	11 397	11 277	10 154	14 808	12 317

Source: 2006 Joint WTO/OECD Report on Trade-Related Technical Assistance and Capacity Building (TRTA/CA). Available at http://tcbdb.wto.org/publish/2006%20Joint%20Report.pdf (accessed 06/06/2009)

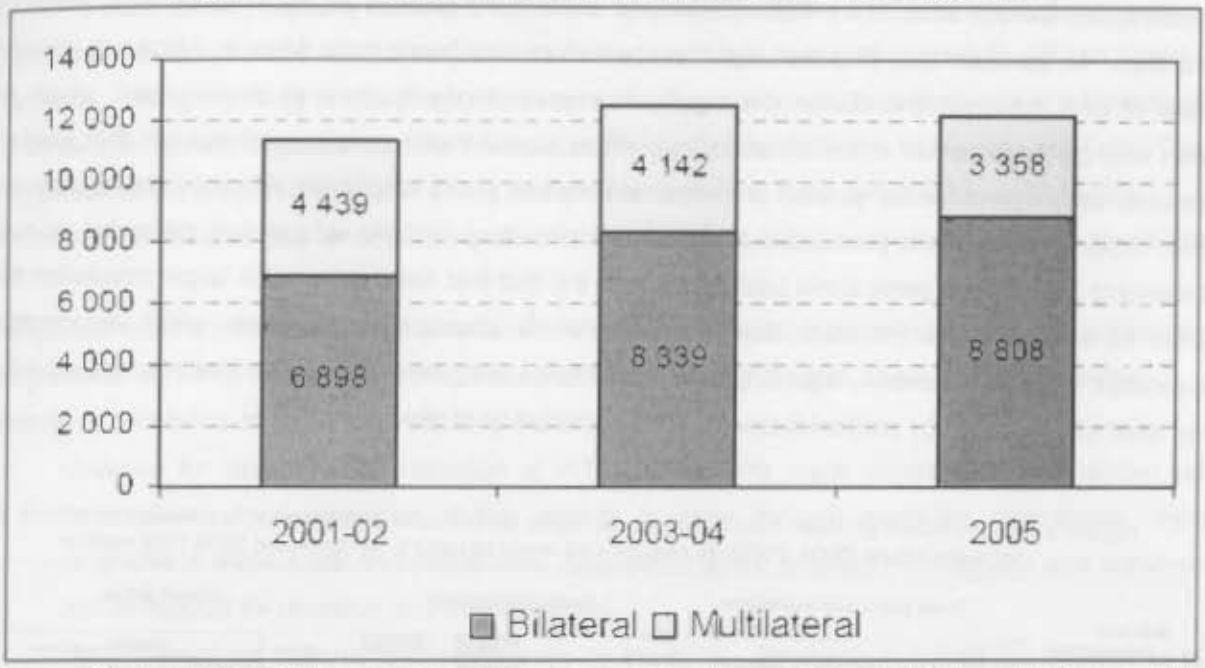
Figures 1 and 2 below show total commitments made by bilateral and multilateral donors towardstrade policy and regulations, trade development and infrastructure. While there has been a steady increase in bilateral commitments to trade development and infrastructure, we see an increasing presence of multilateral donors in trade policy and regulations. Overall, bilateral contributions account for about three quarters of infrastructure TRCB funding,withJapan as the main bilateral provider followed by the USA. The USA was the largest bilateral donor for TD assistance, accounting for approximately 58% of the total. TPR was dominated by multilateral agencies with EU programmes accounting for 55% of the total.

Figure 1: Total commitments to TRTA/CB Constant 2004 US$ million



Source: 2006 Joint WTO/OECD Report on Trade-Related Technical Assistance and Capacity Building (TRTA/CA). Available at http://tcbdb.wto.org/publish/2006%20Joint%20Report.pdf (accessed 17/02/2009)

Figure 2: Total commitments to infrastructure Constant 2004 US$ million



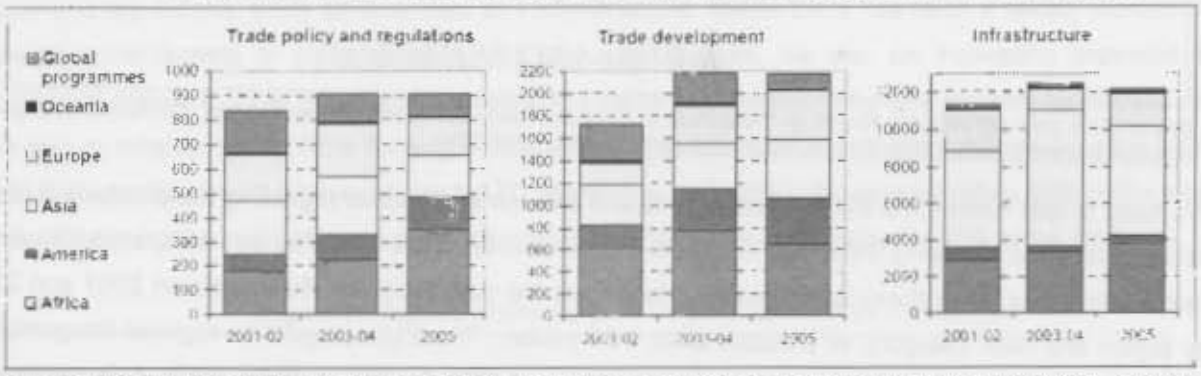
Source 2006 Joint WTO/OECD Report on Trade-Related Technical Assistance and Capacity Building (TRTA/CA). Available at http://tcdb.wto.org/publish/2006%20Joint%20Report.pdf (accessed 17/02/2009)

We need to look further into these commitments and ask some questions regarding the distribution of this assistance - who is getting these funds, and is the distribution of the funds by regions justified?Figure 3 below helps us answer these questions as it highlights the distribution ofTRCB between 2001 and 2005 by region and main category, at constant 2004 US$ million. The EU's support for regional integration in West Africa saw Africa becoming the largest recipient of TPR funding in 2005, while Asia dominated during previous periods. Although Africa has become the largest recipient of TD funding, assistance to the region for these activities has since declined by about US$120 million, to a level almost equal to Asia. Asia is the largest recipient of infrastructural assistance, followed by Africa, which got almost half of Asia's funding. Infrastructure funding in Asia covered large power stations and major transport projects in Azerbaijan, Vietnam and Iraq, and Vietnam respectively (OECD/WTO, 2006). The OECD/WTO report (2006:12) also reveals that the bulk ofTRCB funds in infrastructure went to Lower Middle Income countries.

Based on this distribution it would appear that overall Asia is the largest recipient ofTRCB funding – mainly for infrastructural development. This distribution of infrastructure development funds is notwithstanding the general conclusion of literature on the development impact of infrastructure that sub-Saharan Africa is at the bottom of all developing regions in most dimensions of infrastructural development, and offers the leading opportunities for marginal welfare gains from re-allocation of

resources for it. Buys et al. (2006), Shepherd and Wilson (2006), Calderón andServen (2008), Yeaple and Golub (2002), Bogetic and Fedderke (2005), and Limao and Venables (2001) show that infrastructure deficits account for 40% of transport costs in Africa, and as much as 60% in landlocked countries. In addition, they find that high transport costs and lower trade flows in Africa are mainly a result of poor infrastructure. Given the significant impact of infrastructure on development, which has been strongly documented in the literature, one might expect that a development agenda that seeks to stimulate development in the poorest countries and regions would emphasize Africa by comparison with other regions. The current prioitization of Asia in infrastructure TRCBis not carefully defended in policy documents. Whether it gains some justification from the fact that Asia has a much larger population than Africa its not clear; this therefore, leaves us with some unanswered questions, which are normally associated with aid in general, regarding how TRCB funds are given, who determines what gets funded, and what role is played by political factors in the determination of allocations.

Figure 3 Distribution of total commitments to trade policy and regulations, trade development and infrastructure (2001-2005) by region and main category, at constant 2004 US$ million



Source: 2006 Joint WTO/OECD Report on Trade-Related Technical Assistance and Capacity Building (TRTA/CA). Available at http://crbdb.wto.org/publish/2006%20Joint%20Report.pdf (accessed 17/02/2009)

To further understand the impact of trade-related capacities it will be interesting to examine the extent to which both bilateral and multilateral donors actually honour their commitments. This is an area that warrants further research and has recentlyattracted some attention.

2.3.2 Major TRCB Programmes

In this section a review of major TRCB programmes under implementation is provided, focusing on those programmes being funded and implemented by a number of donors and also covering many countries.

2.3.2.1 *Joint Integrated Technical Assistance Programme*

JITAP, a multi-country capacity building programme, was initiated at the UNCTAD IX Conference on Trade and Development in 1996 in response to the request for technical assistance by African Trade Ministers. Though funding for the programme comes from a number of bilateral donors, it is implemented by three international organisations:the International Trade Centre (ITC), the WTO and UNCTAD. The first phase of the programme (JITAP I) was implemented between 1998 and 2002 in eight African countries and its focus was on developing their human and institutional capacities in order to speed their

integration into the multilateral trading system[9]. A mid-term evaluation led to the launch of a successor programme, JITAP II which covers the period 2003-2006[10]. JITAP I and JITAP II share the same objectives and focus on three main capacity-building areas:[11]

- Capacity for national implementation of WTO agreements, trade negotiations and related policy formulation. Implementation of this activity is done through seminars, workshops, training programs in trade rules and procedures, negotiation skills, provision of manuals and documents, and/or support for research and data collection.
- Development ofa national knowledge base on the MTS. Emphasis is put on the creation of MTS Reference Centres (which are for use by government, the business sector and academia), establishing networks of experts, resource persons and trainers and sharing of knowledge and experiences, among others.
- Enhancing the capability of enterprises to export to new and established markets. Under this effort the programme provides guidance to exporting enterprises on how to explore business opportunities arising from MTS and how to assess the likely impact oftechnical support on national business communities.

The activities of JITAP focus mainly on developing human capacity, national networks of trade experts, collaboration between government and business officials, regional networks through Communication and Discussion Facilities (CDF), links between researchers and policy makers, virtual cooperation among training and educational institutions of beneficiaries, and networks of business communities and business organisations. JITAP II ended in June 2007, and the JITAP Common Trust Fund-Steering Group will determine the structure of future phasesof JITAP if these are commissioned. However, though there are concerns that the programme did not make any significant contribution to enhancing export competitiveness or lifting supply constraints (Luke 2002; UNDP 2003, (*cited in*Dupasquier and Osakwe

[9]The original JITAP countries are: Benin, Burkina Faso, Cote d'Ivoire, Ghana, Kenya, Tunisia, United Republic of Tanzania and Uganda.

[10] New countries added onto JITAP in the second phase are: Botswana, Cameroon, Mali, Malawi, Mauritania, Mozambique, Senegal, and Zambia.

[11] Joint Integrated Technical Assistance Programme (Phase II) JITAP II, 2003-2006:Programme Document

2004), it contributed to development of relevant human resources and the understanding of trade issues in beneficiary countries[12].

Discussions with key trade officials involved in the implementation of JITAP highlightedthe following issues regarding its objectives, design and implementation:

- The main emphasisof the programme has been on human capital and institutional development at both individual and national levels.
- In response to the question *'Are there some studies which were done before adoption ofTRCB programmes which give an economic justification for such a policy? Are there some implicit economic models underlying policy targets?'* I was informed that the economic rationale for the programme is outlined in the project document JITAP I. However, a critical analysis of this document shows that there is no theoretical rationale or justification outlined, apart from reiteration of the fact that JITAP was a response to African Ministers' request for capacity building assistance. This finding is important as it points to the hypothesis raised in this study, that TRCB were not informed by economic research and analysis, but by other factors.
- Responding to the interview question *'How do you decide on one particular TA activity instead of another?'* informants indicated that countries identify their needs, which in most cases depended on which negotiations were current for them at the time of the question. There is little reason to imagine that the order in which trade negotiations occur follows a sequence that has any relationship to what economic welfare analysis would recommend.

Given these findings it is overwhelmingly likely that, where JITAP is concerned, there was little consideration of opportunity costs in setting its objectives or allocations.

2.3.2.2 Integrated Framework

The Integrated Framework For Trade-Related Technical Assistance (IF) was set up in 1997 as an instrument adopted by the international community to strengthen trade and supply-side capacities of Least Developed Countries (LDCs). According to UNCTAD (2006) in 2006 IF was extended to 28 countries, 23 of them from Africa[13], and in 2007 the number increased to 31, with 27 from Africa[14]. Although, the IF was established in October 1997 it only began operating in 2000.The main objective ofIF is to help LDCs integrate their trade policies into national development and poverty reduction strategies and is jointly managed by the World Bank, the International Monetary Fund (IMF), UNCTAD, the WTO, the ITC and the UNDP. IF aims to ensure that the trade is mainstreamed into national development strategies through:creation of domestic awareness of the importance of trade for development; Diagnostic

[12] Strategic Review of WTO-provided TRTA Activities, Final Report (W/COMTD/W/152)
[13] Angola, Benin, Burkina Faso, Burundi, Cambodia, Chad, Djibouti, Ethiopia, The Gambia, Guinea, Lao PDR, Lesotho, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Nepal, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Tanzania, Uganda, Yemen and Zambia.
[14] Additional countries are Central African Republic, Niger, and Sudan.

Trade Integration Studies (DTIS) to identify constraints on trade and technical assistance to countries and actionsthat might integrate countries into the global trading system; integrating the programme of action into national development plans through the Poverty Reduction Strategy Programmes (PRSPs); and implementation of the programme of action in partnership with the development patterns.

Allocation of resources under IF is through two funding windows, with the first window funding DTIS activities and building human resources and Window 2 focusing on funding priority projects identified in the DTIS. As such, the main focus of IF has been on human and institutional capacity building done mainly through meetings with donor communities at national and regional workshops, where information and experiences are exchanged. Funding for IF comes mainly from the LDCs' development partners as part of their overall aid for poverty reduction strategies.

So far DTIS have been completed in 20 countries,followed up by validation workshops. However, it is not clear in the current design if IF is the linkage between DTIS national development programmes and other TRCB initiatives by donors. How IF work is coordinated with other TRCB activities is not emphasised in the design and implementation of IF. The design of IF presupposed local availability of domestic capacity (in terms of institutions and expertise) in LDCs to carry out DTIS, integrate it into the PRSP and map implementation projects. However, this is contrary to reports from other discussions where capacity needs for LDCs have been articulated (WTO Ministerial Conference, 1996; African Trade Ministers' Meeting, 1994). The key under DTIS is to have a thorough understanding of prevailing conditions in the country and how trade can be integrated in the development process so that poverty reduction objectives are achieved. Conditions surrounding policy making in LDCs are highly complex, and the ability to influence policy processes in such settings face numerous challenges. Therefore, without the capacity to adequately assess the prevailing conditions it might be difficult to come up with DTIS that are meaningful for both analytical insights and for policy conclusions. Window 1 of IF makes provision for funding DTIS and local structure without upfront funding for capacity development before the actual DTIS.

2.3.3 TRCB Activities by Major Bilateral and Multilateral Donors

2.3.3.1 ***WTO's TRCB Activities***

The WTO's technical assistance and capacity building activities are specifically designed to enhance institutional and human capacity in beneficiary countries so as to ensure effective and enhanced participation in MTS negotiations and to assist with WTO accession processes. According to the Strategic Review of WTO-provided TRTA Activities Report (2006) an annual average of 480 activities has been undertaken during 2002 to 2004. Almost half of these have been implemented in Africa, with 19%

in Asia, and Latin America and the Caribbean receiving 16%. The WTO's Technical Assistance and Training Plan outline and prioritise TRTA/CB activities based on objectives as identified by beneficiaries. Some of the areas covered under the WTO's technical assistance and capacity building objectives are notifications, trade policy reviews, dispute settlement management, and general and specialised training in trade policy. Activities undertaken by the WTO are coordinated by the Institute for Training and Technical Cooperation (ITTC) and the Technical Assistance Management Committee (TAMC). The TA Plan (2007) groups TA products offered by the WTO under five broad categories:

(i) General WTO-related Technical Assistance and Training;

This activity accounts for a third of TRTA budget and is meant for training Government officials who are charged with WTO-related responsibilities but are identified as lacking adequate general understanding of the WTO's rules and regulations. This training is aimed at exposing participants to WTO issues, in particular WTO Agreements and current topics ofnegotiation. The main objective is to improve relevant human capital through provision of new information. Tools used to implement the activity are Geneva-based Trade Policy Courses (TPCs) and Regional Trade Policy Courses (RTPCs); Introduction Courses; Geneva-based Thematic Courses and Regional and Sub-regional Short Trade Policy Courses (STPCs).

Trade Policy Courses (TPCs)

The duration of Trade Policy Courses is 12 weeks.Participants undertake interactive modules, attend lectures and selected official WTO meetings, and do exercises and simulations. While TPCs and RTPCs share the same objectives and offer similar training opportunities, the RTPCs have an institutional development dimension and provide a platform for networking among regional peers.

Introduction Courses

Introduction Courses and Regional and STPCs are similar to TPCs and RTPCs respectively but are of shorter duration (between one and three weeks), and provide general introductory information about the WTO such as its rules, functions and agreements. On the other hand Geneva-based Thematic Courses usually focus on one group of WTO issues, with a view to identifying what would constitute realistically achievable progress in the selected area of negotiations. Thus these shorter courses emphasize depth over breadth. The courses are offered in partnership with other organizations involved in the area of work.

(ii) Specialised and Advanced Technical Assistance and Training

Under this activity training is offered on specific topics for specialists either in Geneva or in the field.The programmeconsumes another third of the TRTA budget. Training can be in the form of

seminars, workshops or specialised courses at either national or regional level or in Geneva. This category contains the following sub-categories of activities: (i) Geneva-based specialized training, (ii) national TA activities, (iii) regional seminars and workshops, (iv) advanced training programmes for senior government officials, (v) intensive courses on trade negotiations skills and outreach activities for Parliamentarians and civil society participants. ITTC organizes these courses and partners with other relevant organizations.

(iii) Academic Support for Training and Capacity Building: An Integrated Approach

Activities under this category account for 3% of the TRTA budget and include workshops for university professors, support programmes for doctoral studies and research collaboration. The aim is to build institutional capacities at national levels. Specific tools used range from (i) regional trade policy courses, (ii) follow-ups to RTPCs, (iii) workshops for university professors on WTO matters, (iv) support programmes for doctoral studies, (v) a programme for visiting academics, and (vi) research collaboration, (vii) a document dissemination programme for universities.

(iv) Support Technical Assistance and Training Facilities

Under this category of TA, assistance is provided to delegations and beneficiaries both in Geneva and in the field, through the following sub-activities: (i) Geneva-based topic-specific symposia, (ii) WTO introductory Day, (iii) trainee programmes and internships and (iv) other forms of Geneva-based support in the form of*Geneva Week*and a newsletter for non-residents, briefing sessions through video-conferencing, serving regional groups, and provision ofadvice on legal issues. In the field, support includes provision of infrastructure such as a reference centre and print and electronic training material.

(v) E-Learning

This category makes use of information technology and the internet to widen the number of beneficiaries of WTO training material. E-learning can be offered either through (i) e-training, involving an interactive internet learning environment for government officials from developing and least developed Members and Observers; (ii) self-training, through computer-based training modules (CBTs) available on the WTO webpage or on CD-ROMS or DVDs or through (iii) briefings, which consist of combinations of slide presentations, video files and reference documents all stored on one CD-ROM.

According to WTO officials, technical assistance offered by the organization prior to DDA 2001 was not structured, but was mainly demand-driven. The following pointswere highlighted in interviews:

- The mandate of the WTO to address TA was confirmed at the formation of the 2001 DDA. This inclusion of TA under the DDA was introduced as a bargaining tool to encourage developing countries to endorse the agenda and permit the Round to be launched. Thus, the motivation for this commitment was at least as much political as economic. The events in Seattle during the 3rd WTO ministerial meeting in 1999 were especially important in this regard. According to one of the delegates at the meeting, one of the demands of developing countries, in particular African countries was to "secure more technical assistance in meeting stringent WTO rules and international product standards" through institutionalizing ofTRCB/CB[15]. Part of their opposition to the new ('Singapore') issues which were being raised by the developed countries was the absence of capacity to implement WTO agreements. Given this background and the absence of an explicit policy evaluation, there is a strong basis to argue that the adoption ofTRCB initiative was motivated more by politics than economic analysis. The impasse in Seattle had clearly shown developing countries' disappointment with the negotiation system. Therefore they had to be won back to the negotiation table; and one such way was through addressing capacity issues.
- Countries identify their priorities through needs assessments, and then the WTO prioritizes activities based on the demands of the member countries. It was also noted that the WTO does not request to see the assessment reports. In this kind of scenario one would expect that beneficiary countries are satisfied with TRCB being offered to them; but contrary, sentiments expressed by representatives of recipient countries based in Geneva were that the kind of TA being offered is both inappropriate and/or adequate to address the needs of African countries. In fact, one representative went further and argued that the TRCB being offered is not the type of TA African Trade Ministers requested in Tunis in 1994, and does not address fundamental issues that constrain Africa's international integration and growth. If, then, what is on offer is not what was requested, what then informs the current design and implementations ofTRCB programmes?
- WTO TA is product driven, though the WTO responds to specific country needs that are not covered in the TA plan.

In addition to the five broad TA products/activities the WTO, in conjunction with other agencies, is also involved in the implementation of JITAP and IF.

2.3.3.2 United Nations Industrial Development Organisation

According to the Joint WTO/OECD Report (2006), UNIDO is the largest multilateral provider of TRTA/CB and it works in partnership with other agencies to ensure that capacity is built for member countries to take advantage of trading opportunities. UNIDO aims at enabling developing countries to establish the necessary physical and institutional infrastructure that meets the technical requirements of the MTS, so

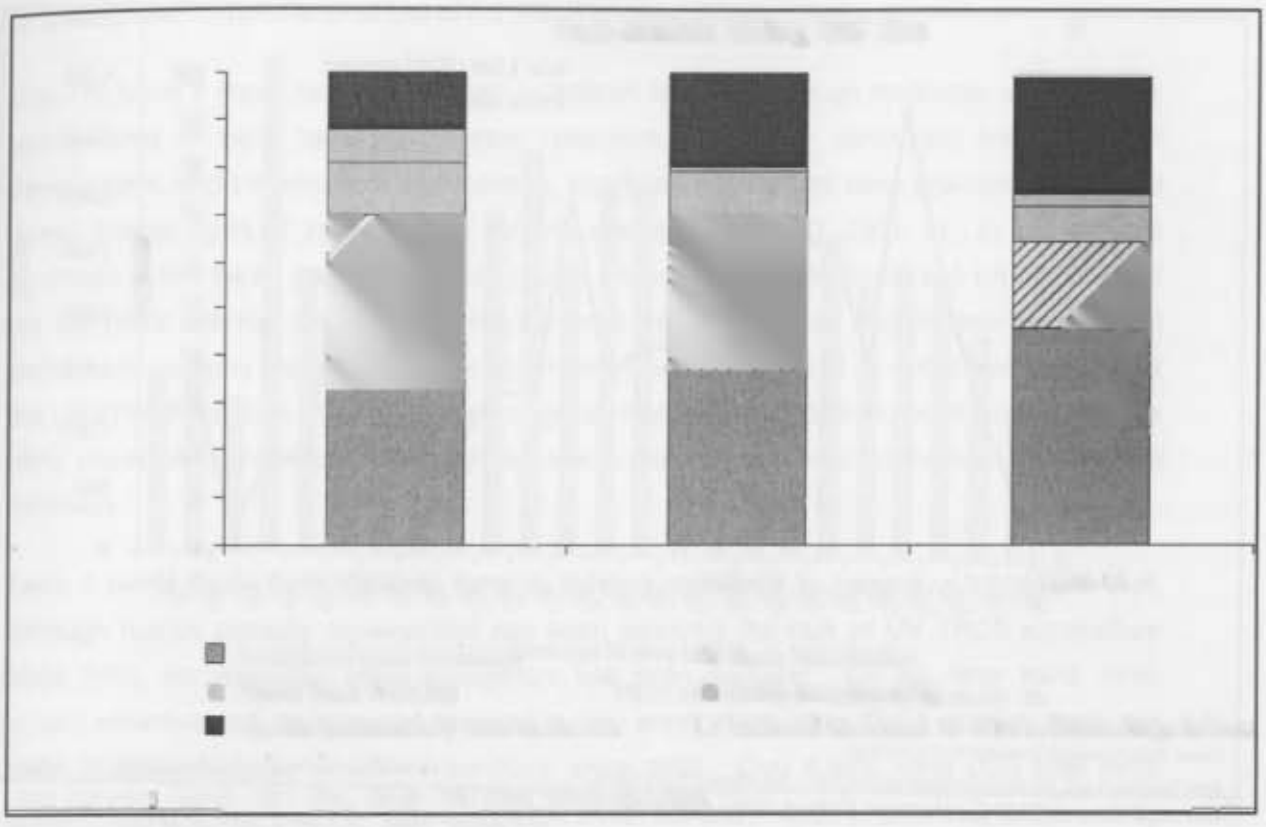
[15] Available at http://www.un.org/ecosocdev/geninfo/afrec/vol13no4/1wto1.htm, accesses on 21/02/2009

as to increase the share, amount and volume of developing countries' exports (UNIDO, n.d.)[16]In its efforts to build this kind of trade-related capacity in developing countries UNIDO has targeted small and medium sized enterprises though its '3C's' approach, which focuses on the following three main areas: (i) developing competitiveness, (ii) promoting conformity and (iii) enhancing connectivity. A wide range of specific activities have been offered by UNIDO, includingdevelopment ofindustrial policyand supportive institutional structure, SME development and access to finance, cluster and export consortia development, development and harmonisation of standards, certification (ofboth products and enterprise systems), upgrading industrial capacity, technology forecasting and diffusion, transfer and investment promotion; creation of enabling environments for SMEs, consumer protection, assisting selected enterprises to meet ISO 9000[17], ISO 14000[18], HACCP[19] and other relevant international standards and Good Manufacturing Practices, and improving productivity, quality and competitiveness.Activities implemented by UNIDO are structured in such a way that they address trade facilitation supply constraints and market access issues.

2.3.3.3 The World Bank

One of the key international institutions supporting strengthening of trade-relatedinstitutions and infrastructure in client countries is the World Bank. According to the Independent Evaluation Group (IEG, 2006: xiii), between fiscal years 1987 and 2004, about 8.1 percent of total World Bank commitments ($38 billion) went to 117 countries to help them better integrate into the global economy. According to the evaluation, the number of loans devoted to trade-related institutions (primarily customs) accounted for 37 percent of trade-related lending between 1995 and 1999, making this the single largest thematic area supported (IEG, 2006:17). The rationale for the Bank's involvement in trade was based onthe importance of trade for economic growth and the role of openness in enhancing a country's economic efficiency. Areas of focus for the Bank's trade-related support have been trade liberalization, institutional trade facilitation (for example, customs), infrastructure-related trade facilitation (such as air freight, ports), private and public trade finance, and technical assistance for trade negotiations, (IEG, 2006:xiv). The evaluation noted that the Bank' trade-relatedassistance has gone through three phases.The first phase (1980s –early 1990s) was ultimately deemed to be narrow in focus and based on underestimation of the complexities and sequencing of complementary policies.Under pressure from this criticism, the second phase,running from mid 1990s to late 1990s, saw decline in the Bank's trade support.The third phase, which arose against the background of the collapse of the WTO Seattle Ministerial Meeting in 1999, saw the focus shift to research, advocacy, capacity building, and operational activities.Summarising, the

[16] Available:: http://www.unido.org/doc/25393, accessed 30/05/ 2007.
[17] 'International Organization for Standardization (ISO) 9000 series of standards has been adopted around the world for defining and documenting quality management systems for organizations of any size and type'
[18] This ISO series deals with the environmental management systems
[19] Hazard Analysis Critical Control Point System (HACCP)



capacity building would specifically focus on achieving exactly that. It is, therefore, not farfetched to question the comprehensiveness of US TRCB to these African countries.

'The US funds a broad range of activities in support ofTRCB. Though resources are especially concentrated in trade facilitation, human resources and labour standards, financial sector development, and infrastructure development, significant funding has been provided for nearly a dozen diverse types of trade capacity building assistance' (USAID, 2001: 3). In line with the emphasis in this thesis placed on human capital enhancement, institutions and infrastructure,all the US TRCB activities were grouped into the three main categories. Specific activities grouped under each category are outlined in the appendix. However, it should be noted that grouping all the US'sTRCB activities into these three categories imposes some definitional difficulties because ofthe possibility of overlaps, especially between human capacity and institutional development initiatives.

Table 2 below shows the US's trade capacity building assistance by category. It highlights that, although human capacity development has been receiving the bulk of US TRCB expenditure since 2001, the proportion ofthis expenditure has been declining. On the other hand, while initially infrastructural development received a very small share ofthe TRCB budget, there has been a steady increase in such expenditure since 2002. Only 6.59% ofthe US's total trade capacity building was spent on infrastructure in 2002, but this jumped to 28.9% by 2005, and by 2006 had reached 39.3%. The basis of thisshift is not clear from TRCB policy documents. It might have reflected a unilateral policy reevaluation, or alternatively might have been due to collaboration with other TRCB providers that emphasize the other categories, hence allowing USAID to devote more resources towards infrastructural development.

Table 2: US' Trade Capacity Building Assistance by Category (As a % of Total TRCB)

TRCB Category[20]	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Human Capacity	52.44	56.77	51.55	47.87	36.99	26.58
Institutions	38.69	36.64	39.04	36.64	34.11	34.12
Infrastructure	8.87	6.59	9.41	15.49	28.90	39.30
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: USAID (2005) "Participation, Empowerment, and Partnership: Seeking Sustainable Results through US Trade Capacity Building" (*Groupings and % shares are author's computations*).

[20] See Appendix 11.

UNECA is mandated to support the social and economic development of its member states, foster regional and sub-regional integration and promote international co-operation for Africa. Services offered to member states by UNECA include; (i) policy analysis and advocacy, (ii) partnership enhancement, (iii) technical assistance (iv) communication and knowledge sharing and (v) supporting regional activities. These services have been implemented mainly through meetings and workshops, training courses, specialized research work and advisory services on specific issues and policy briefs, which highlight the negotiating issues, their likely impact on African economies and also offer recommendations on bargaining positions. Most of these services are offered to negotiators by the ECA Advisory Services, based in Geneva.

In addition to these, the UNECA has undertaken a number of initiatives aimed at strengthening its member states' ability to effectively participate in multilateral trade negotiations. According to OECD (2005: 74), the following are some of the specific activities implemented by UNECA to enhance negotiation capabilities of its member states.

- UNECA and the African Union (AU) organized a high-level brainstorming meeting for African trade negotiators in Mauritius in June 2003. The meeting came up with a consolidated African position which was later used at the Cancun WTO Ministerial Meeting in September 2003.
- An expert group meeting was organized by UNECA in collaboration with the AU and the government of Ghana in November 2003 to evaluate the implications of the Cancun WTO meeting for African countries and to develop and refine strategies for further negotiations and identify immediate research needs.
- A training workshop on enhancing capacities in agricultural trade negotiations was conducted in Tunisia in April 2004.

Table 3 below summarizes all diverse TRCB activities offered to developing countries into the three major generic focus areas (human capacity, institutional and infrastructure development); and then matches them to major donor agencies that are involved in their provision.

Table 3: Summary of TRCB Activities by Organization

	MAJOR TRCB PROGRAMMES		MAJOR AREAS OF FOCUS			
	Joint Integrated Technical Assistance Programme	Integrated Framework	Human Capacity Development		Institutions	Infrastructure
			Government Officials	*Business Sector*		
World Trade Organisation (WTO)	✓	✓	✓			
United Nations Conference on Trade and Development (UNCTAD)	✓	✓	✓		✓	
International Trade	✓	✓		✓		

Centre (ITC)						
United Nations Development Programme (UNDP)		✓				
United Nations Industrial Development Organisation (UNIDO)				✓	✓	✓
United Nations Economic Commission for Africa (ECA)			✓			
World Bank		✓				✓
International Monetary Fund (IMF)		✓				
United States of America				✓	✓	✓

Source: *Author compilation.*

It is however, worth noting that data recorded under TCBDB might not be comprehensive, as it might not include all aid flows supporting human capital, institutions and infrastructure. Future researchshould look at the TRCB in the broader context of DAC statistics, which measure official and private flows from DAC donors, multilateral organisations and other sources.

2.4 RELATED EMPIRICAL LITERATURE

Lack of trade capacity has been singled out by the international community as one of the key impediments to development, as shown by the emphasis of the Doha Ministerial declaration on the central role ofTRCB (Piazza and Sdralevich, 2004). TRCB has concentrated on three main facets which are human capital and institutional development (in the form of regulatory reform) and infrastructural capacity development. Policy variants are mainly distinguished by placing different levels of relative emphasis on these three targets.

Even though TRCB issues have rapidly gained prominence in trade policy circles, empirical work in the area is still quite limited. However, there has been work in related strands of economic literature, such as studies of the effects of infrastructure on trade, oftrade facilitation on trade, andof effects of institutions and regulatory reform on trade. In addition, there have been a number of discussions, policy and seminar papers written on TRCB activities, though with a noticeable absence ofanalytical academic studies evaluating their effectiveness or opportunity costs. Available empirical literature lacks insight on the impact of trade-related technical assistance offered by different donor agencies; the present thesis is an attempt to fill this gap. In this section I will provide anoverview of such limited policy assessment literature as exists.

2.4.1 An Overview ofTRCB Policy papers

Renewed interest in TRCB issues has resulted in an increasing number of donors publishing guidelines for strengthening trade capacity development. The Organisation for Economic Cooperation and

Development (OECD) published such guidelines in 2001, drawing heavily on case studies of capacity building efforts in El Salvador, Ghana, Senegal and Vietnam. The OECD report (OECD, 2001) focused on capacity building to enhance developing countries' participation in the MTS through the WTO. The OECD guidelines noted the complexity of trade issues, and hence urged the need to address capacity gaps in a wide range of areas. The main contribution of the guidelines to the TRCB debate is that, 'they provide overall policy guidance and a common reference point for trade aid and finance communities on capacity development for trade, putting trade capacity building in the context of comprehensive approaches to development and poverty reduction' (OECD, 2001: 17).

Solignac-Lecomte (2001) provides a framework for trade capacity development and trade policy progress, as well as relating some practical experience with trade capacity development (TCD) based on TCD activities in African-Caribbean-Pacific countries. According to the author, policies that favour trade and enhance firms' participation in foreign markets are the two main requirements for a country to successfully integrate into the world economy - implying that donor support for TCD should be based on these two aims. The major contribution of the paper is that it highlights issues to look at when considering either strengthening policy making capacities or enhancing the competitiveness of firms. At the policy making level, issues to consider are analysis, formulation, negotiation and implementation. With respect to enhancing the competitiveness of firms, donors should consider intervention in infrastructure, standards and technical requirements, information, and marketing and management. The paper also emphasized the need for TCD programmes to be demand driven.

Solignac-Lecomte's review of TCD activities in ACP countrieshighlights the following limitations:

- Biased Aid arises when donorsdecide what type of assistance to render according to their interests as opposed to those of the recipient country.
- Lack of donor coordination and capacity bottlenecks frequently handicap specific trade focused projects.
- Absence of comprehensiveness often afflicts approaches to trade capacity issues. Of all the programmes reviewed JITAP was noted as an `exception' in this respect, despite some weakness revealed in its mid-term review in 2000.
- A legitimacy problem for TCD activities arises due to the fact that the link between trade development and poverty is still far from clear to both developing countries' policy makers and within donor agencies. This prompts Solignac-Lecomte to scepticism about the institutional prioritization ofTCD.

Deere (2005) examines the political dimensions of trade-related technical assistance and capacity building (TACB), focusing primarily on WTO-related issues,and argues that there is need for more demand-driven TRCB. The paper argues that to achieve fairness and predictabletrading environments there is a need to overhaul the way in which trade-related technical assistance and capacity building for

trade negotiations, regulation and policy reform is pursued (Deere, 2005:3). Deere stresses that unequal political and economic power relations are a defining feature of the global trading system, and argues thatTACB efforts should therefore focus on empowering developing countries to act independently with respect to domestic reforms. This would at minimum suggest the following capabilities for a country:

> (1) a team of technically competent, diplomatically-savvy negotiators in Geneva that can participate effectively and persuasively in ongoing negotiations and decision-making;
> (2) an equally informed back-up team in the capital able to articulate the various national interests,negotiating objectives and strategies, as well as a layer of expertise external to government(in business, academia, research centres and NGOs) that can provide trade policy advice togovernment;
> (3) an effective domestic policymaking process which involves a spectrum of relevant government agencies and draws systematically on expertise and advice external to the government;
> (4) an ability to forge, maintain and service effective coalitions with other countries on particular issues of negotiation; and
> (5) the capacity to use the WTO's dispute settlement process to defend and advance legal rights.

Unfortunately these are areas that are rarely addressed by TACB. Deere further notes that review of recent evaluations of TACB initiatives reveals a recurring set of shortcomings, not only with the quantity but also with conceptualisation, quality and delivery. Commonly cited shortcomings include inadequate assessment and articulation of needs, donor-driven priorities, biased content, inadequate donor evaluation and coordination, inadequate funding, weak support for local capacity, and weak linkage to broader development strategies (Deere 2005:3).

Puti (2005) sets out a comprehensive vision for a trade-related support plan for Least Developed Countries (LDCs). The paper based on synthesis of policy reports, discussions and sentiments within the international community, argues that the condition that LDCs are in today is very similar to that of Europe in the aftermath of the WWII, implying that, if a similar initiative to the Marshall Plan was devised welfare gains would be realized. Among other strategies, the paper suggests provision of standards-related capacity to overcome market entry barriers and the creation of Aid for Trade fund, with seed money of $1 billion. The paper also emphasises the importance of productive capacity, competitiveness and critical infrastructure. The author also raises another possible dimension ofTRCB not currently explored in the ongoing programmes, namely south-south cooperation, arguing that initiatives among developing countries complement the multilateral liberalization process. This call was based on the fact that trade between developing countrieshas been increasing with share of exports rising from 22 per cent in 1998 to more than 31 per cent in 2003 (Puti, 2005:43). While the intended purpose for the proposed 'Trade

Marshall Plan" is noble, absence of empirical analysis to back such propositions raises questions about their feasibility and anticipated impact. For instance, is $1 billion (proposed in the paper) enough to kick start a comprehensive TRCB programme in developing countries, given their huge capacity demands?

In addition to reviews ofTRCB activities, there are also annual reports on TRCB activities by the donor community (e.g. Joint WTO/OECD report (various issues), Strategic Review of WTO, (2006)) which give descriptive information on types ofTRCB activities being implemented - when, where, amounts spent, and so on. Findings in these documents fed into the discussion of the previous chapter; and as such will not be repeated here. The information contained in these reports/documents is interesting in its own right, but falls short of addressing queries about the extent to which developing countries are benefiting from such initiatives, what are the trade offs of implementing one form ofTRCB at the expense of the other, and whether resources being maximally utilised. Such lack ofcritical insights means that policymakers interested in developing TRCBstrategies cannot really pursue evidence-based policy. However, if they design policy anyway, there is a big chance that it will be ineffectual. That kind of analysis is the central topic of my thesis, which aims to evaluate TRCB performance under different policy scenarios.

In the crucial area of the impact ofTRCB on trade/growth in SSA, there is one econometric paper by Dupasquier and Osakwe (2004). They report both parametric and non-parametric correlation tests of the likely long-run impact of trade capacity building in SSA. The paper reviews JITAP and the Integrated Framework initiatives and notes that the outcomes of some TRCB projects are intangible in the short run, thus making it difficult to conduct impact assessment. The paper also notes that in addition to donor TRCB projects, other government initiatives also affect capacity development, hence making it difficult to determine proportions due to donor TRCB support. Absence of long series aggregate data on trade capacity building by country and donor is also noted. The paper therefore makes use of a cross-section approach for its analysis, constructing correlations of expenditure on TRCBwith key economic and social variables. On this basis, inferences about the likely impact ofTRCB are drawn. Their major findings are that there is a positive and significant correlation between expenditure on trade capacity and domestic regulatory quality (government effectiveness), that trade capacity building promotes exports, and that there is a positive correlation between trade capacity and political instability and also a positive correlation with HIV/AIDS prevalence. Political instability and high HIV/AIDS levels imply sustainability problems in the long run. Generally, the findings of the paper give mixed evidence regarding long-run sustainability ofTRCB in SSA.

The authors note that SSA countries are incapacitated by lack of negotiation skills, being small in economic size and political power, lack of financial resources, lack of well-trained trade economists, limited exports and production structure diversification, and lack of the capacity to exploit trading opportunities due to supply constraints. The paper recommends that donors pay more attention to poor

educational systems, lack of access to trade information, poor infrastructure, brain drain concerns, and HIV/AIDS.

2.4.2 Overviewof Related Previous Work

Closely related to TRCB are trade facilitation issues which have recently attracted a lot of empirical interest. Trade facilitation issues were added to the new basket of trade issues during the Singapore Ministerial Meeting of the WTO in 1996 (Wilson, Mann and Otsuki, 2003). Borrowing from Woo and Wilson (2000), Wilson*et al*(2003:2) give a broad definition oftrade facilitation as an initiative that '...implies improved efficiency, in the administration, procedures, and logistics at ports and customs.... and streamlined regulatory environments, deeper harmonisation of standards, and conformance to international regulations'. In earlier studies Computable General Equilibrium (CGE) models were used to quantify the benefits of improved trade facilitation. 'In CGE models an improvement in trade facilitation can be modelled equivalently as a reduction in the costs of international trade or as an improvement in the productivity of the international transportation sector. Since this sector is already included in the CGE model, the effect of improved trade facilitation comes from shocking the sector by an appropriate amount' (Wilson*et al* 2003:4-5).

This thesis will borrow heavily from papers that have used gravity model analyses to assess the benefits of trade facilitation from both international and regional perspectives. While TRCB is a multi-dimensional initiative that addresses human capacity, infrastructure and institutional issues, related studies in most cases take a single-sector approach. This limits understanding of comparative benefits ofTRCB policy mixes.

According to Limao and Venables (2001) the real cost of trade,which includes transport and other costs of doing business internationally, are the important determinants ofa country's ability to participate fully in the world economy. In their paper, the authors focus on one aspect ofTRCB (infrastructure) and highlight the dependence of trade costs on it. Measures for infrastructure used in the study are related to the quality of transport (road and rail) and communication networks. The main finding of the paper is that infrastructure is the main determinant of transport costs, especially for land locked countries, where it accounts for 60% of transport cost compared to 40% in coastal countries. The paper estimates that a deterioration of infrastructure from the median to the 75th percentile of destinations raises transport costs by 12%. Regarding the importance of transport costs in determining trade flows, the paper finds an elasticity of trade flow with respect to transport cost in the range of -2 to -3.5. Using an elasticity of -3 the paper concludes that doubling the transport costs from a median value reduces trade volumes by 45 percent.

Shepherd and Wilson (2006) use the gravity model to show that improved road network quality in Europe and Central Asia improves interregional trade flows. The paper uses two measures of road quality which are weighted average of paved roads in both the exporting and importing countries and minimum percent of paved roads across exporting, importing and transit countries. Using simulations the authors show that an improved road network canproduce more trade benefit for a region than tariff reforms or improved customs. Inter-regional trade could increase by 50% above the baseline. The paper also shows that by focusing on improving road networks in countries which are important transit corridors inter-regional trade could be increased by 30%, raising the issue of spillovers in infrastructure projects.

In a study ofthe impact of road network quality on intra-regional trade in Sub-Sahara Africa, Buys et al. (2006) arrive at conclusions similar to those ofShepherd and Wilson (2006). The paper makes use of spatial network analysis to map the network of roads in Sub-Saharan capitals and cities. A gravity model then is then employed to estimate current overland trade flows in the network between 3403 city pairs. The authors then simulate the impact of an improved road network to a functional quality comparable to current levels in The Gambia and Zimbabwe. Their simulation shows an increase in intra-regional trade of $250bn over 15 years due to a coordinated improvement in the road network, with total expenditure of approximately $35 billion for upgrading and maintenance (Buys et al. 2006:45). Even though this paper focuses exclusively on one component of infrastructure (quality of road network), the methodology employed in the analysis (in particular the simulation to estimate the impact of upgrading the road network) is of particular interest for the present thesis, which makes similar use of simulation.

Nordäs and Piermartini (2004) examine the role of infrastructure quality on trade performance. The authors use the following indicators to capture infrastructure quality: roads, airports, ports, telecommunications and time required for customs clearance. They argue that poor infrastructure inflicts costs by causing unnecessary delays, and therefore include transport time in the specification of infrastructure quality. They authors also maintain that uncertainty with regard to delivery time increases total transaction costs because 'the more uncertain is delivery, the more inventory is needed as a buffer stock if demand fluctuations are unrelated to fluctuations in delivery time' (Nordäs and Piermartini, 2004: 2). The paper uses a gravity model to evaluate the impact of infrastructure quality on trade in three sectors - automotive, textiles and clothing manufacturing. The general finding is that quality of infrastructure has a positive and significant impact on bilateral trade flows, with port efficiencyfound to have the largest impact. 'Timeliness and access to telecommunication are relatively more important for export competitiveness in the clothing and automotive sector respectively' (Nordäs and Piermartini, 2004: 1). The major contribution of the paper is the broader definition of infrastructure to include behind-the border indicators that impact on international trade transaction costs, and the inclusion ofresistance parameters related to both tariffs and remoteness. Like most papers on trade facilitation this paper looks at one aspect ofTRCB(infrastructure), and therefore does not go further into assessing the relative

importance of other factors that affect transaction costs such as institutions, which according to the model specification of the paper are captured through country fixed-effects.

Jansen and Nordäs (2004: 2) remind us that 'international trade involves contracts between parties operating in different jurisdictions, different institutional environments, and different currencies and often speaking different languages'. The authors note that these differences result in uncertainties regarding quality and quantity of goods shipped and received, and cause high transactional costs associated with contract negotiations, enforcement and information and financial flows. They therefore analyse the effect of domestic institutions on total volume of trade and direction of trade, controlling for domestic infrastructure.They conclude that a country's level of openness and bilateral trade flows are positively and significantly influenced by quality of institutions. Using data from Kaufmann et al, the paper identifies three indicators to measure the quality of institutions: government effectiveness, rule of lawand, control of corruption. The study finds that institutional variables have a significant and positive impact on trade flows. It also finds that tariffs have a significant impact on trade flows only if interacted with institutions, implying that the impact of tariff reduction on trade is significant only if institutions are good. The authors also include quality of infrastructure, and find the relation between domestic institutions and bilateral trade to be less robust. On bilateral trade analysis the study finds that 'relative bilateral tariffs are strongly and negatively related to bilateral trade flows' (Jansen and Nordäs, 2004: 21). While these authors address some of issues of interest to this thesis, they do not develop the argument further to assess the benefits on trade flows as a result ofimprovements in the quality ofinstitutions and infrastructure.

Anderson and Marcoullier (2000) also examine this issue ofinstitutions and trade flows and conclude that trade expands when supported by strong institutions[21]. The authors note that ignoring issues of contract enforcement and security of exchanges will result in estimates with omitted variables bias. They consider two types of insecurity, pertaining to predation and to imperfect enforcement of contract, and show that that both translate into price mark-ups.

Wilson, Mann and Otsuki (2003) explore the relationship between trade facilitation, trade flows and GDP per capita based on trade among members ofthe Asia Pacific Economic Cooperation (APEC) trade area. They use four broad indicators (port efficiency, customs environment, regulatory and electronic-business usage) to define trade facilitation, and estimate their relationship with trade flows using an augmented gravity model. Their findings indicate that port efficiency improvement has a large and positive effect on trade. Through a simulation exercise which tests differential improvements in these four areas, the authors estimate benefits of specific trade facilitation efforts. They find that intra-APEC trade would

[21] "..specifically, by a legal system capable of enforcing commercial contracts and transparent and impartial formulation and implementation of government economic policy" (Anderson and Marcoullier, 2000: 2).

increase by $254 billion if those countries that are below the average improve their capacity to the sample average.

Piazza and Sdralevich (2004) provide evidence on the role of trade capacity in the diversification or product differentiation process of SSA countries. The paper describes trade capacity as the 'availability of trade-oriented infrastructure, institutions, know-how, necessary to export competitively on foreign markets, and the ability to gain access to those markets through bilateral and multilateral negotiations and participation in multilateral trade organizations' (2004: 2). Given this definition of trade capacity the paper then uses the notion of revealed trade capacity as measured by the OECD's share in each SSA country's total trade. The authors argue that the more differentiated the goods the more difficult it is for SSA countries to export them to more developed markets. This hypothesis is tested using a standard bilateral trade gravity equation augmented with a term representing the interaction between development and product differentiation, and tariffs data with an industry breakdown. The authors use a gravity model with standard variables of borders, distance, colonial ties (colony), common language, Gross Domestic Product (GDP), landlocked, tarrifs for both the exporting and importing country. The model is then augmented by an interaction term that combines the SSA exporters' trade capacity with the level of development of the target market and Rauch index that measures of sectoral differentiation. The following model specification is estimated

Equation 1:

$$\ln(\exp_{ijm}) = \alpha + \beta borders_{ij} + \gamma in(distance_{ij}) + \lambda \ln(gdp_i) + \mu \ln(gdp_j) + \delta(colonoy_{ij}) + \phi(commonlaguage_{ij}) + \tau(landlocked_i) + \omega(landlocked_j) + \theta(avgtarif_{ijm}) + \pi(rauchindex_m) + \rho(interaction1_{mj}) + \varepsilon$$

Where *i* and *j* stand respectively for the exporting and the importing country.

The preliminary results of the study support the idea that SSA countries may need trade capacity building focused on helping them understand developed countries' markets for manufactured products.

Wilson, Mann and Otsuki (2005) develop a gravity equation to assess the benefits of trade facilitation from a global perspective. They distinguish four categories of trade facilitation which are port infrastructure, customs environment, regulation and e-business infrastructure, and include them in a gravity model. The paper adopts a trade facilitation definition that incorporates both at-border and inside-border elements, thus covering issues such as port efficiency, customs administration, domestic regulatory environment, and services infrastructure. The following is the gravity model specification used in the paper:

Equation 2

$$InV_{ij}^{t} = \alpha_0 + b_1 \ln(100 + TARIFF_{ij}^{t}) + b_2 \ln PE_J + b_3 \ln RE_J + b_4 \ln SI_J + b_5 \ln PE_I + b_6 \ln RE_I$$
$$+ b_7 \ln inSI_I + b_8 CE_I + b_9 \ln GNP_I^t + b_{10} \ln(GNP_J^t) + b_{11} \ln(GNPPC_I^t) + b_{12} \ln(GNPPC_J^t)$$
$$+ b_{13} \ln(DIST_{JI}) + b_{14} D_{ADJ} + b_{15} D_{ASEAN} + b_{16} D_{NAFTA} + b_{17} D_{LAIA} + b_{18} D_{AUNZ} + b_{19} D_{MERCOSUR} + b_{20} D_{EU}$$
$$+ b_{21} D_{ENG} + b_{22} D_{FRC} + b_{23} D_{SPN} + b_{24} D_{ARB} + b_{25} D_{CHN} + b_{26} D_{GMN} + b_{27} D_{POR} + b_{28} D_{RUS} + b_{29} D_{2000} + \varepsilon_{Ji}^{t}$$

where i and j stand for importer and exporter respectively; PE, RE, SI are indicators for port efficiency, regulatory environment and service sector infrastructure; V_{ij} is the value of exports from j to i; $TARIFF_{ji}^{t}$ is the specific applied tariff rate between j and i in year t; CE_i is the customs environment variable for the importer; GNP is the Gross National Product; GNPPC is per capita GNP; $DIST_{ij}$ denotes geographical distance between capital cities of i and j; D_{NAFTA}, D_{ASEAN}, D_{LAIA}, D_{AUNZ}, $D_{MERCOUSUR}$, D_{EU} are trade agreement dummies; D_{ENG}, D_{FRC}, D_{SPN}, D_{ARB}, D_{CHN}, D_{GMN}, D_{POR}, D_{RUS} are language dummies; and D_{ADJ} is the adjacency dummy which takes a value of one if i is adjacent to j and zero otherwise.

While the paper concludes that improvement in all three forms of trade facilitation yields an increase in global trade, 'results also show that each trade facilitation variable has a different estimated relationship to trade flows, implying that improvement in one category of trade facilitation will yield a different effect on trade than improvement in another category of trade facilitation' (WMO 205:851).

Helble, Mann and Wilson (2009) study brings together literature on the relationship between trade facilitation and trade flows, and aid flows and trade flows with the aim of investigating the effectiveness of foreign aid towards trade facilitation in increasing trade of developing countries. In their analysis the authors make use of disaggregated data on aid flows which allows them to examine the relationship between trade and different types of aid extended and received. The paper classified trade facilitation into four categories namely narrow, broad, hard and soft trade facilitation[22]. Using data covering 16 years from 1990 to 2005, the study employs a gravity model to analyses the effectiveness of trade aid on trade flows. The findings show evidence that aid for trade facilitation is positively related to both exports and imports of the recipients. According to the study, targeted aid for trade agenda associated with trade policy and regulations will yield the highest returns for exporters.

Gamberoni and Newfarmer (2009) analyseboth supply of and demand for aid for trade. They argue that under-performance in export markets by many developing countries resultsfrom trade-related capacity constraints, which include weak infrastructure (transport, ports, telecommunications and information

[22] Narrow trade facilitation focused on both border and behind the border reforms; Broad – includes border (ports, roads) and services (telecoms, finace); hard – investment into infrastructure projects (board aid) and soft trade facilitation includes – institutional capacity related to trade.

technology), under-developed trade-related institutions (customs and port management) and insufficient incentives to export (Gamberoni and Newfarmer, 2009:11). Their paper makes use of a gravity model and cross-sectional data for 2006 to explore capacity indicators that predict trade levels. In their model, if quality of infrastructure increases by 1 percent trade increases by 4 percent.For institutions,they find that if the time it takes to convey and process exports through customs is reduced by one day, this leads to a 3.5 percent increase in exports.Where trade-related incentives are concerned,the paper finds that reducing the exporter share of tariff lines subject to tariff peaks by 10 percent raises exports by roughly 2 percent.

Gamberoni and Newfarmer argue that if indicators of infrastructure, institutions and trade policy related incentives have such strong influence on trade flows, thencountries with poor quality on these indicators should benefit from aid for trade. The paper further explores how donors can gauge potential demand/users for trade-related assistance by focusing on those countries that have internal capacity limitations as shown by poor infrastructure,inefficient customs facilities,weak trade-related institutions, and disincentives to export because of high tariff peaks and ill-designed trade policy. A country is taken to be in need of aid for trade it falls intothe bottom rankings in all of these areas. Using a scale ranging between 1 and 5 (best capacity to worst), the authors approximate potential demand for aid for trade by simply adding up a country's total score. If a country is in the bottom quintile (a score of 5) in all the areas it receivesthe highest possible score. The finding of the paper is that most LDCs and other low-income countries show strongest potential demand for aid for trade. However, bilaterally supplied aid for trade (lincludingaid from Japan, the US and the EU)shows a greater share (52 %) going to middle income countries.Most multilateral aid for trade goes, more appropriately, to low income countries. The authors conclude that some countries receive far less aid for trade than their potential demand indicates. In addition, they argue that several countries have not fully harnessed the global economy to best serve their development goals, and theythus identifyurgent need to draw governments' attention to competitiveness strategies and mobilisation of aid for trade resources (Gamberoni and Newfarmer, 2009:11).

Portugal-Perez, Alberto and Wilson (2010) estimate the impact of aggregate indicators of "soft" and "hard" infrastructure on the export performance of developing countries. They looked at 101 countries over the period 2004-2007. They make an important contribution by constructing four new aggregate indicators related to trade facilitation from a wide range of primary indicators, (collected mainly from the WEF's Global Competitiveness Report, Doing Business, the World Development Indicators,8 and Transparency International), using factor analysis. The authors identify four indicators, two of them more related to hard infrastructure as i) physical infrastructure and ii) information and communications technology (ICT). The other two indicators are more closely linked to the "soft" dimension: iii) border and transportefficiency and iv) the business and regulatory environment. The impact of these trade facilitation indicators on trade

performance is assessed using a gravity model, with a two-step selection model to deal with sample selection bias. The authors also take note of a potential reverse causality problem(endogeneity) and address it in three ways. Firstly they employ an approach adopted by Francois and Manchini (2007)and regress trade facilitation on income per capita and population, using the unexplained residuals to proxy for the trade facilitation indicators.Secondly,trade facilitation indicators are instrumented by their 3-year lagged value.Finally,they examine effects oftrade facilitation indicators on new products.The analysis shows that improvement in infrastructure quality would bring the greatest benefits in terms of export growth, and that among the four indicators, physical infrastructure has the greatest impact on exports in almost all specifications and samples used. Using gravity estimates the authors show that improvements in infrastructure and border and transport efficiency halfway to the level of the regional top performer show promising results. For example they estimate that if quality of physical infrastructure in Egypt were to increasehalf-way to the level of Tunisia, this would increase Egyptian exports by 10.8 percent. However, the authors find that when the endogeneity problem is controlled for the effect of physical infrastructure is smaller than the baseline estimates.

Iwanow and Kirkpatrick (2008) construct aggregated indicators of trade facilitation (in the on-the-border sense), and infrastructure for 2003 and 2004, using simple averagesof primary indicators mainly collected from Doing Business and the World Development Indicators. They estimate a standard gravity model augmented with these indicators and find a positive impact of the three indicators on exports. To focus theiranalysis more specificallyon Africa, the authors interact their indicators with an African dummy, and find that policies that improve their indicators yield a higher effect in African countries compared with the rest of the world.

Njinkeu, Wilson and Powo Fosso (2008) assess the trade facilitation agenda for Africausing a gravity model of bilateral trade in the African countries and the Rest of the world. They follow the approach of Wilson et al. (2003a, 2003b, 2004) by including a set of trade facilitation indicators (port efficiency, customs and regulatory environment, and services infrastructure) as well as tariffs and dummies for regional trade agreements to see which of these factors might have a greater effect on intra-African trade flows. To account for zero or missing bilateral observation the authors make use of Tobit model in their estimation of an augmented gravity model which includes the following variables: value of manufactured exports from country j to i; the applied tariff rate in the percent ad valorem term that is specific to trading partners i and j; national indicators of port efficiency, customs environment, regulatory environment, and service infrastructures; gross national incomes and per capita GNI coefficients; and dummy variables to capture the effect of preferential trade agreements, language similarity and adjacency. They find that port efficiency and services infrastructure are the factors that have the largest positive effect on African trade, with customs and regulatory environments being the main obstacles to intra-African flows. In conclusion, the authors note that in their sample 43.53% of importer-exporter pairings had zero bilateral trade; hence

they call for further research that focuses on factors that may explain why trade does not occur at all among some pairs of countries.

In adifferent but related strand of literature, Grainger (2007:12) provides a review of trade facilitation that classifies it according to four principles: simplification, standardization, harmonization and modernization of international trade procedures. The main focus is on day-to-day operational issues of moving goods across national borders, with the aim of identifying potential improvements to interfaces between businesses and governments. The authors note that, despite the prominence of trade facilitation in recent years, literature that employs rigorous research methods remains meager (Grainger 2007:4). Additionally, substantiated research that looks at quantifying trade transactional costs is also rare, making it difficult to quantify benefits. Grainger argues that to understand the context of trade facilitation one has to take note of the increasing internationalization of production structure and business supply chains. Therefore, in the international environment in which production take place, simplification of procedures and ensuring smooth interfaces between businesses and governments become major challenges for trade facilitation. As tariff rates have fallen, trade negotiators have focused increasingly on non-tariff areas. Therefore, to facilitate trade a number of international, regional and national governments have promoted best practices, improved business-government cooperation, the adoption of technical standards and harmonized trade and customs procedures (Grainger 2007:12).

Suwa-Eisennman and Verdier (2007) survey the recent theoretical and empirical literature that explores the relations between aid and trade, and highlight some recurring issues. They question whether aid policies tend to act as complements or substitutes of trade policies. The expectation, they suggest, should be that trade policy influences trade flows, either because of economic conditions created by trade-related assistance, or because aid is tied to trade and reinforcesbilateral economic and political links between giving and receiving countries. However, the literature reviewindicates that there can be reserve causality between aid and trade. Thus the literature taken as a whole fails to provide straightforward and robust results regarding complementarity between aid and trade flows. The paper discuses literature that looks at income transfers and how they affect welfare of both donor and recipient countries. The authors note that existence of trade barriers can result in recipient countries losing from aid transfer. The issue of tied aid and how it affects the impact of aid transfer is another issue of particular interest. The review highlights a finding by Wargner (2003), who shows that increasing aid to a country by 10% increases the donor country's exports to the recipient by 1.63%. What generally emerges from Suwa-Eisennman and Verdier (2007)'s review is that there is a myriad of possibilities that can arise from Aid and Trade analysis; the relationship is not direct, measures are not standard, and there are no straightforward robust results in the literature.

The literature review here shows that empirical research assessing the impact of trade-related capacity building and trade facilitation is very recent and addresses three main issues: definition and measurement of indicators (with some literature focusing on a narrower definition while others look at the broader aspects of TRCB); choosing an econometric methodology to estimate the impact of trade-related capacity building and trade facilitation on trade flows; and designing a scenario to estimate the effect of improved trade-related capacity building and trade facilitation on trade flows. Many of the studies are produced exclusively by policy-makers, and contain tools, recommendations, reports, position papers, and commentaries.In sum it is voluminous. There remain, however, significant gaps in the academic literature on traded-related capacity building.

This thesis aims at capturing a broader question than the one reviewed by most literature.In particular, it aims at investigating the opportunity costs of different TRCB policy mixes in SSA. Thus the choice of literature for inclusion in the foregoing review was guided by methodological considerations. Mann, and Otsuki (2003) were the first authors to measure the impact of trade facilitation on trade performance using a gravity model.They also introduced the simulation methodology to estimate impact of different policy scenarios.The present study borrows heavily from their approach, and narrows its literature review mainly to work that is straightforwardly comparable with them.Therefore, the discussion of literature in this review has been selective rather than exhaustive, focusing on results upon which subsequent analysis builds. Many researchers have grounded their studies more explicitly on either trade facilitation issues or sub-elements ofTRCB, in particular infrastructure and institution issues. The former, which is a narrower focus than TRCB, investigates the impact of border issues on bilateral trade flows. While I do not deny the potential relevance of this work, in the current environment of reduced development aid, the need to prioritise budgets becomes more pressing. This justifies my departing from most previous researchers in focusing on opportunity costs. To rectify the paucity of theory pertaining to this, I make use of policy simulations and estimate benefits of different TRCB policy initiatives. The key precursor papers which *are* available to be built upon are Shepherd and Wilson (2006), who applied leading elements of the methods on which I will rely to trade facilitation issues in Europe and Central Asia and Wilson, Mann and Otsuki (2003) who treat the Asia-Pacific Economic Cooperation (APEC) trade area with these same methods.

Policy simulation methodology has the advantage that one may adopt different TRCBpolicy mixes to test responses of trade flows. A number of different policy simulations are presented in the thesis. Such focus on opportunity costs may benefit policy practitioners because it may provide new insights on how to manage TRCB initiatives for higher benefits.

2.5 CONCLUDING REMARKS

In this chapter,based on interview work and desk study, we have interrogated the design, coherence and implementation ofTRCB activities by bilateral and multilateral donors. Several issues have emerged from this analysis:

First, there is a wide range of specific TRCB products on offer in developing countries, which are either earmarked towards human capital, institutional or infrastructural development[23]. Providers ofTRCBdo not focus their efforts exclusivelyon one kind ofTRCB initiative but in every case offer initiatives in at least two of these areas. More specifically, all agencies are involved in human capacity development although the focus is different from one to another. (For example, the WTO emphasizes training of government officials, while the ITC emphasizes training ofsmall to medium size business entrepreneurs). However, the donor community seems to have recognized that they cannot do all things; hence coordination and synergies are being emphasized (e.g. in the case of JITAP and IF), and calls are emerging to leverage available funds so as to get the most out of the resources.

Second, while activities being implemented by both bilateral and multilateral donors are clearly articulated in programme documents and also by trade officials in interviews, what do not emerge from these documents are exact theoretical or empirical rationales forvarying emphasis placed on different initiatives. How decisions are made is not clear from programme document - in particular, the reasons as to why different activities get precedence over others from different donors are not clearly specified. For instance, why is it that Africa gets more assistance for trade policy and regulations related activities as opposed to trade and development or infrastructure development? Likewise, why has Asia been getting very large amounts ofTRCB funds for infrastructure over the years? Africa's level of infrastructure development is much lower than that of other developing regions. Could it be that infrastructure investment in Asia is more welfare-enhancing on the margin than in Africa? Or could it be that infrastructure investments in Asia have greater impact because its institutions are better than Africa's? This possibility highlights the possible importance of complementarities in trade capacity building.

Third, from interviews and discussions with trade officials in Geneva there emerges the view that TRCB initiatives were undertaken as a means to bring developing countries on board to allow the launch ofthe Doha Round following the collapse of the Seattle WTO Ministerial Meeting. In the absence of explicit policy evaluation adequately addressing questions raised in this chapter, among others, it seems unlikely that TRCB initiatives have been closely informed by rigorous economics of trade and development and empirical research. This raises an issue which warrantsin depth analysis: the political economy of trade-related capacity building. It could be that because TRCB/trade facilitation came under the WTO umbrella through contestation around the so-called 'Singapore Issues" dividing developing and poor from developed countries, only secondarily economic political considerations may have dominatedgenuine

[23] With the 2006 Joint WTO/OECD report outlining 24000 TRCB activities.

economic rationales and drivers. As noted above, Gamberoni and Newfarmer (2009), in their study of supply of and demand for aid for trade conclude that some countries receive far less aid for trade than their potential demandindicateds. According to the authors, this could be due to excessive corruption, political instability or poor investment climates,which affect aid effectiveness and hence the elegibility of countries for aid. Therefore, once TRCB become associated with trade negotiations, trade bindings and other performance criteria; it could be TRCB becomes strongly informed by other considerations. Deere (2005) recognises the importance of considering the political dimensions of trade-related technical assistance and capacity building, and notes that outcomes of trade negotiations are often asymmetric, placing onerous burdens on developing countries.Furthermore, Deere (2005:7) notes the imbalance in negotiating power (both in terms of basic representation, and size and skills of negotiating teams) between developed and developing countries. Not only are developing countries not adequately represented in Geneva but they also have limited access to back up expertise in their capitals (Deere, 2005:12). According to Deere, the Quad group of countries (Japan, EU, Canada and the USA) with a combined population of about 900 million, have twice as many professional staff permanently based in Geneva as all developing countries with an aggregate population of about 4.1 billion.

Fourthly, no systematic implementation strategy or identification criteria seem to be in place to guide donors globally. For instance, TRCB activities implemented by bilateral donors seem to be dictated by their respective development agendas which are normally outlined in national policy papers. For instance, Denmark's TRTA/CB strategy is outlined in *Trade and Development: Tackling Poverty (2003)*, and that of the EU as a whole in *Trade and Development: Assisting Developing Countries to Benefit from Trade (2002).* Japan's TRTA/CB activities are guided by *Action Plan for Implementing the Paris Declaration (2005).*The US follows the goals laid out in*USAID strategy paper, Building Trade Capacity in the Developing World (2003).*Such a scenario, in which programmes are informed by different policy strategies with different objectives and priorities, raises more questions than answers regarding issues of coherence, coordination and synergies among implementing agencies. In addition, if specific TRCB activities are guided by donors' policies, how relevant or appropriate are they likely to be to recipient nations' development needs?

It is against this background of both increased demand for and supply ofTRCB assistance, in theabsence of explicit policy evaluation, that I consider its potential value and opportunity coststo warrant in-depth analysis. Given that resources are limited, there is need to evaluate the impact of trade-related technical assistance offered by different agencies.Rodrik (2001) raises concern regarding policies that explicitly promote international integration, alleging that this diverts resources from some other urgent development needs of poor nations. The present thesis makes a contribution to the TRCB policy debate by providing research and analysis that interrogates in detail the following three important questions:

- Are the weights assigned to different components of trade-related capacity building activities in existing TRCB programmes justified?
- To what extent will participation in the MTS be enhanced by trade-related capacity building (TRCB)?
- Given the fact that more resources on TRCB imply fewer for other development priorities, what is the opportunity cost of investing resources in one particular TRCB approach as opposed to another?

To find answers to these questions, the following chapter focuses on empirically assessing the effect ofTRCB through estimation of a standard gravity model augmented by TRCB proxies.

CHAPTER 3

THE IMPACT OFTRADE-RELATED CAPACITY DEVELOPMENT ON SUB-SAHARAN AFRICAN TRADE

3.0 INTRODUCTION

The main focus of this chapter is the empirical evaluation ofTRCB policies, using a gravity model. The chapter discussesin detail the data used in this thesis in terms of its sources, definitions, and proxies used in the construction ofTRCB indicators. In the same chapter the theoretical foundation ofthe gravity model, which is later used in the empirical section, is also discussed. Special attention is given to specification and sample selection bias issues, and to how these issues have been addressed in recent empirical literature and in this thesis.

Using the Heckman two-step selection approach, this chapter focuses on the estimation of the gravity equation to determine the relative impactsof institutions, infrastructure and human capital on bilateral trade flows. To adequately investigate these relative impacts ofTRCB the empirical analysis will be organized around the following four main themes:

- Whetherand to what extent TRCB matters in determining trade flows;
- Whether interactionsofTRCB policy mixes (policy complementarities) make a difference;
- Whether and to what extent Africadiffers from the rest of the world in response of trade to TRCB, and
- Whether the results are robust to changes in estimation methodology or to the change in the constructions ofTRCB-related composite indicesof variables.

There has been a surge of empirical literature which has looked at these issues in the context of trade costs, which have been identified as an important determinant of a country's ability to participate fully in the world economy (Limao and Venables, 2001). The model is estimated using trade patterns in 2005 for a set of 117 world countries of which 24 are in sub-Sahara Africa[24]. This dataset gives 13572 possible bilateral export relationships and approximately 15% of these export flows are zeros. In recent contributions to the theoretical literature on the gravity model the issue of zero bilateral trade flows has received attention. It has been noted that disregarding these zero flows may bias estimates if their occurrence is not random. To avoid such bias a sample selection model based on the methodology of Heckman (1979) is adopted in our estimation. The gravity equation is also estimated using other approaches that have been suggested to deal with zero trade values in order to assess the sensitivity of

[24] List of all the countries in the sample is given in Appendix 3, with SSA countries highlighted in bold letters.

the results to use of different methods. A comparative evaluation of policies aimed at increasing human capital, infrastructure and institutional capacities, is also undertaken. This simulation exercise will be the basis for measuring the opportunity costs of the TRCB policy options.

3.1 DESCRIPTION OF THE TRCB VARIABLES

Trade-related capacity building goes beyond trade facilitation (which has dominated empirical literature in recent years) which focuses on mere movement of goods across borders. Considering supply-side capacity is in the spirit of the Hong Kong Declaration, which recognized the need for countries to address such capacity to realizing benefits from WTO agreements. As mentioned above, three distinct areas for trade-related capacity building are identified as institutions, infrastructure and human capital. In addition to a number of articles in the agreements reached at the conclusion of the Uruguay Round and General Agreement on Tariffs and Trade (GATT) making provision for these areas; our overview of on-going TRCB activities also points towards concentration of investment in these domains. Hencethis thesis takes into account those factors that limit economies' capacities to produce tradable goods. This however, raises challenges with regard to measurement and methodological issues,further compounded by lack of data on a number of indicators that could be used to capture trade capacity building initiatives, especially in Africa. We therefore identify proxies for TRCB initiatives. Informed by both theoretical, empirical literature and my interview work in Geneva, we use a number of variables to come up with composite indices for trade-related institutions, infrastructure and human capital. These indices are generated using survey information from the World Economic Forum's Global Competitiveness Report (GCR), and the World Bank's Doing Business Report. We rely on survey information because of the limited availability of relevant trade capacity building indicators. Data on trade, tariff and GDP came from the UN's COMTRADE database, TRAINS; and World Development Indicators (WDI) respectively. Appendix5 gives a full description and the data sources of all variables used in this thesis.

A central feature in our analysis of opportunity costs ofTRCB initiatives is the classification ofTRCB activities into human capital, institutions or infrastructure. The following sub-sections give a full description ofthe TRCB categories and indicators used in their construction.

3.1.1 Institutions

This category captures the quality of the social infrastructure (institutions) of the economy. There has been an increase in interest in the role of institutions for the functioning of markets. This resurgence of interest might be due to a general consensus that 'well-developed institutions are likely to decrease the transaction costs for market participants and thus increase the efficiency of markets' (Jansen and Nordäs 2004:9). From the literature review, there emerges an observation that inefficient institutions raise the price of traded goods, due to the insecurities surrounding doing business in the international market

(Jansen and Nordäs 2004). Taking into account findings of the body of work on the role of institutions and also on the focus of the current TRCB initiatives, this thesis defines and measures quality of institutions using a composite index constructed from selected sub-indicators, all drawn from the World Economic Forum (WEF) Executive Opinion Survey and the World Bank's Doing Business Report. Most of the responses in the WEF survey were ranked on a scale of 1 to 7, with the lower figure corresponding to poor performance while rising numbers are desirable. Table 4below defines all the variables used in arriving at TRCB indicators, according to the survey questions which the respondents were asked.

Table 4: Institutions Sub-Indicators

Category	Sub-Indicator	Source of Data	Definition	Justification for including the variable in the composite index
Institutions	University/Industry research collaboration	World Economic Forum, Global Competitiveness Reports (2005: 506).	'In its R&D activity, business collaboration with local universities is (1 = minimal or nonexistent, 7 = intensive and ongoing)'	Review of the main features of technical assistance in trade policy shows that research assistance and networking links between think tanks and trade policy makers have received considerable attention. In addition, both growth and trade theory predict that expenditure on research has a direct impact on growth and export growth. Empirical literature has also found that networks of social learning are important in the diffusion of technology e.g. Conley& Udry (2005) *cited in*Bardhan (2004).
	Property rights	World Economic Forum, Global Competitiveness Reports (2005:552).	'Property rights, including over financial assets, are (1=poorly defined and not protected by law, 7=clearly defined an well protected by law)'	Francoisand Manchin (2007) use 'legal system property rights' as one of the sub-indicators in their construction of an institution index.
	Presence of demanding regulatory standards	World Economic Forum, Global Competitiveness Reports (2005:584).	'Standards on product/service quality, energy, and other regulations (outside environmental regulations) in your country are (1 = lax or nonexistent, 7 = among the world's most stringent)'	In order to participate in trade a country/exporter has to conform to the requirements of its clients and markets. This sub-indicator is therefore intended to capture the importance in the multilateral trading system of harmonising standards of both products and enterprise systems. This is one of the technical assistance areas emphasized by UNIDO, which provides capacity building in harmonisation, certification of products and systems issues. In addition, there is also the Standards and Trade Development Facility (STDF) a joint initiative through which Food and Agriculture Organisation (FAO), World Organisation for Animal Health (OIE), World Bank, World Health Organisation (WHO) and WTO combine efforts in assisting developing countries to meet international standards in human and animal health, and phytosanitary situation so that they gain or maintain market access (WTO, 2006).
	Financial market sophistication	World Economic Forum, Global Competitiveness Reports (2006: 492).	'The level of sophistication of financial markets in your country is (1= lower than international norms, 7 = higher than international norms)'	Beck (2002) *cited in* Bardhan (2004) noted that all other factors being equal institutional factors in credit markets affect the level and structure of exports. Weaknesses in the financial market are serious in the early stages of development and therefore affect the level of specialisation and restrict poor countries to the production of primary goods which do not require a lot of working capital. According to the 2006 Africa Development Indicators, with the exception of Kenya, Mauritius and South Africa, Sub-Sahara Africa's financial systems are very weak and need to be strengthened.
	Number of	World Bank, Doing	All generic procedures those	

	administrative procedures required to start a business	Business	are officially required for an entrepreneur to start up and operate an industrial or commercial business. These include obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions with relevant authorities (general numbers ranging from one to many hundreds; a low figure is desirable).	
	Number of documents required for exports/imports	World Bank, Doing Business	All the documents required for exporting or importing goods are recorded. Documents include port filling documents, customs declaration and clearance documents and official documents exchanged between the concerned parties. Documents filed simultaneously or in packages are considered different documents but with the same time frame for completion. (general numbers ranging from one to many hundreds; a low figure is desirable).	IMF Staff (2002) note that numerous and complex customs procedures and requirements generate substantial costs and at times this documentary red tape in customs can increase the imports cost by around 7-10 percent of the value of trade.
	Number of procedures required to enforce a contract	World Bank, Doing Business	All procedures mandated by law or court regulation that demand interaction between the parties, or between them and the judge (or administrator) or court officer are recorded. (General numbers ranging from one to many hundreds; a low figure is desirable).	This indicator is meant to capture the efficiency of the legal system, at the same time measuring the economy's approach to regulations. This is very important given the uncertainties surrounding international trade where issues such as contract negotiation and enforcement are crucial, along with protection of intellectual property rights which affect innovation capacities.

3.1.2 Infrastructure

The importance of infrastructure in economic development has well been established in the empirical literature, which has shown that quality of infrastructure directly and indirectly affects trade cost as well as the productivity of factors of production (Agènor 2006, Bogetic and Fedderke2005, Wilson et. al 2005, Jansen and Nordäs 2004, Nordäs and Piermartini 2004, Limao and Venables 2001).[25] Also, in the policy debate, adequate supply of infrastructure services has been noted as an important factor in economic development (Calderon and Serven 2008). Hence, inclusion of infrastructure in this study has its basis in the theoretical and empirical literature for both growth and international trade. In addition investment climate surveys conducted in Africa have also shown that poor infrastructure in African economies has severely hampered investment (OECD/NEPAD 2005). In this thesis, therefore, infrastructure indicators are designed to measure the extent to which an economy has the necessary physical infrastructure required to produce goods for export as well as to move goods (exports and imports) across borders. Empirical literature shows that, geographical disadvantages such as being landlocked and remote from global markets, increase transport costs and greatly reduce both intra and inter regional trade (Limao and Venables 2001). In coming up with a composite infrastructure index, I take note of the difficulty of isolating trade-related infrastructure promotion from infrastructure development more generally; hence I followed the approach adopted by the joint OECD/WTO database in regarding all infrastructure aid as trade related. I depart from the other literature that has looked at infrastructure and trade by including other proxies for infrastructure (in particular, 'Extent of marketing', 'Quality of competition in the ISP sector', and 'Extent of business use of the Internet') beyond the general indicators (port, telephone/fax lines, railroad, air transport and electricity supply). This was motivated by my findings in policy document reviews of on-going TRCB activities. Table 5 below shows and defines (according to the data source) the sub-indicators aggregated to come up with a quality of infrastructure composite index. The last column of the table gives reference to other empirical literature that has used the same indicators and finds them significant in explaining trade flows.

[25] These papers are instances of recent empirical work that investigates the relationship between trade costs and quality of infrastructure; hence they serve to shed light on proxies used in measuring quality of infrastructure.

Table 5: Infrastructure Sub-Indicators

Category	Sub-Indicator	Source of Data	Definition	Other empirical studies that have used these sub-indicators as a proxy for infrastructure
Infrastructure	Ports	World Economic Forum, Global Competitiveness Reports (2005: 542).	'Port facilities and inland waterways in your country are (1=underdeveloped, 7=as developed as the world's best)'	Wilson et.al, (2005) used port efficiency as a proxy for infrastructure.In Nordas & Piermartini, (2004) infrastructure variable is a composite index of roads, ports, air and telecommunications. In Jansen & Nordas (2004), infrastructure is an aggregated index including quality of roads, ports, airports, railways and telecommunications
	Air transport infrastructure quality	World Economic Forum, Global Competitiveness Reports (2005: 543).	'Passenger air travel in your country is (1=infrequent and inefficient, 7=as extensive and efficient as the world's best)'	Jansen & Nordas (2004)
	Railroad infrastructure development	World Economic Forum, Global Competitiveness Reports (2005: 541).	'Railroads in your country are (1=underdeveloped, 7=as extensive and efficient as the world's best)'	Jansen & Nordas (2004)
	Telephones/fax infrastructure quality	World Economic Forum, Global Competitiveness Reports (2005: 546).	'New telephone lines for your business are (1=scarce and difficult to obtain, 7=widely available and highly reliable)'	Jansen & Nordas (2004)
	Quality of electricity supply	World Economic Forum, Global Competitiveness Reports (2005: 544).	'The quality of electricity supply in your country in terms of lack of interruptions and lack of voltage fluctuations is (1=worse than in most other countries, 7=meets the highest standards in the world)'	
	Extent of marketing	World Economic Forum, Global Competitiveness Reports (2005: 595).	'The extent of marketing in your country is (1=limited and primitive, 7=extensive and employs the world's most sophisticated tools and techniques)'	The reason for classifying this under infrastructure is that the relevant survey question asks about the tools and techniques used in marketing and many of these are dependant on quality of infrastructure services at business's disposal.
	Quality of competition in the ISP sector	World Economic Forum, Global Competitiveness Reports (2005: 511).	'Is there sufficient competition among the Internet service providers (ISPs) in your country to ensure high quality, infrequent interruptions and low prices? (1=no, 7=yes, equal to the best in the world)'	A lot has been said about the benefits of internet access and services, in particular as a trade support tool. It can be used to improve access to information and explore international markets[26] 'The growing importance of electronic commerce in global trade led the members of the WTO to adopt a declaration on global electronic commerce on 20 May 1998 at their Second Ministerial Conference in Geneva, Switzerland' (WTO, 2001)[27]. However, in developing countries access to internet services has been constrained mainly by telecommunication infrastructure gaps. Modernizing the information infrastructure is one element important in transiting to a knowledge economy, an issue that has gained significant recent attention (Chen & Dahlman2005). The eleven-fold increase in South Korea's per capita GDP between 1960 and 2003 was attributed to knowledge. Competition in ISP leads to decreases in costs of networking, hence increases affordability and usage of information infrastructure which in turn increases sharing of existing knowledge (Chen& Dahlman2005:4). The International Telecommunications Union notes that developed countries have 312 Internet Service Providers (ISPs) per 10,000 people, while there are 6 Internet Service Providers per 10,000 in developing countries(International Trade Centre, International Trade Forum, 1999)
	Extent of business use of the Internet	World Economic Forum, Global Competitiveness Reports (2005: 515).	'Internet use by business in your country to buy and /or sell products and services is (1=very low, 7= very widespread)'	Even though tariff and non-tariff issues impose considerable market access barriers for developing countries, extensive use of the internet by businesses can improve their access to market information and hence promote their global market access.

[26] Available at, http://www.tradeforum.org/news/fullstory.php/aid/100/Using_the_Internet__Exploring_International_Markets.html, accessed 26/05/2009.
[27] Available at, http://www.wto.org/english/thewto_e/minist_e/min01_e/brief_e/brief18_e.htm, accessed 26/05/2009

3.1.3 Human Capacity

According to Bergheim (2005:1) 'human capital is the sum of the abilities and knowledge of individuals. It measures the quality of labour supply and can be accumulated through education, further education and experience. Education is an investment in human capital, while learning is the process of acquiring knowledge or skills through study, experience or teaching'. Bergheimalso argues that education as a factor in development should not be identified with formal education alone, as much human capital enhancement is generated by continuous updating and replacement of depreciated knowledge with new knowledge through on-the-job training, seminars, etc.

Similar sentiments are expressed by the World Economic Forum's Global Competitiveness Report (2005: 23) which notes that 'the quality and quantity of higher education provided within an economy are critical for competitiveness, for preparing quality staff for more complex roles in areas, such as production, marketing, management, and R&D. In addition to formal education, on-the-job training has become an increasingly important method of upgrading an economy's human resources'.

OECD/NEPAD (2005:11) argues that the level of human capital is very low in Sub-Saharan countries. As a result human capital development is one of the major challenges confronting the region. Lack of it hinders the region's ability to increase productivity and compete in the global economy. Leontief (1947)'s analysis of US trade patterns highlighted how efficiency of workers influence trade patterns. It is therefore unsurprising that the overview of on-going trade-related technical assistance shows that human capacity issues have been given considerable attention in particular by the WTO and to some extent ITC, which trains business entrepreneurs. Therefore, the human capital indicator developed in this paper is designed to capture what TRCB is doing for human resources development.Given the current political economy of world trade, whereby trade negotiationsplay an important role in determining international trade policy, and ultimately the intergration of developing countries into the multilateral trading system, it is not surprising that level and quality of human capacityplays a crucial role in trade. (See background and introduction discussion in Chapter 1). The ability of trade negotiators to negotiate good trade deals and to acquire information by networking with other knowledgeable parties should increase with improved human capital. Furthermore, there are other factors needed to improve trade such as harnessing new technology in production, information and technology, and marketing;to identify just two that require skilled manpower. It is in this context that the sub-indicators chosen for human capital mostly reflect higher education skills required for complex task management associated with trade promotion. The construction of an index to measure human capital is based on the following sub-indicators which are defined and motivated in the Table 6 below.

Table 6: Human Capital Sub-Indicators

Category	Sub-Indicator	Source of Data	Definition	Justification for including the variable in the composite index
Human Capital	Tertiary enrolment	World Development Indicators	School enrolment, tertiary as a percentage of the relevant age group.	Though not included in the current focus ofTRCB, tertiary enrolments captures a minimum level of human capital available in an economy. This has long being regarded in the development literature as a crucial element of human resources development. Some empirical literature has used the average years of schooling of the population aged 25 to 64 years as the best measure of the minimum quality threshold of the stock of human capital that can promote growth (Bergheim (2005). Romer (1999) also notes that the initial level of literacy is important for understanding subsequent growth. According to Bergheim (2005), enrolments might not be the best measure of today's human capital but they do provide useful insights about future human capital. In the absence of more discerning data we use this less-than ideal indicator
	Brain drain	World Economic Forum, Global Competitiveness Reports (2005:529).	'Your country's talented people (1 = normally leave to pursue opportunities in other countries, 7 = almost always remain in the country)'	This tendency for skilled labour to migrate from poorer countries to richer ones in search of better pay and secure jobs, is frequently identified as a major development obstacle for many developing countries and LDCs. 'The International Organisation for Migration (IOM) estimates that some 300 000 professionals from the African continent live and work in Europe and North America. By same estimates, up to a third of R&D professionals from the developing world are believed to reside in the OECD area[28]. Given these magnitudes, brain drain can undermine human capacity development efforts. Therefore there is need to take cognisance of it in assessing actual human resources retained in an economy after capacity building initiatives have been put in place. It is possible that under some circumstances such initiatives could build capacity that doesn't stick. (On the other hand, emigrees can serve as a base for business and cultural relationships with their home countries that can in turn promote trade.)
	Quality of management schools	World Economic Forum, Global Competitiveness Reports (2005: 604).	'Management or business schools in your country are (1 = limited or of poor quality, 7 = the best in the world)'	Following the same argument that human capital development goes beyond the learning in the basic education system, the existence and quality of management schools affect the extent of continuous updating and replacing of knowledge, and acquisition of new skills in line with responsibilities that come with management positions.
	Extent of staff Training	World Economic Forum, Global Competitiveness Reports (2005:	'The general approach of companies in your country to human	This has been the main focus of WTO TRCB activities, which involve offering both short term and long term courses for government officials. Empirical evidence also exists that shows that human capital is facilitated by training (Baldwin and Johnson, 1995). The authors argue that training 'is an extension of

[28] http://www.oecdobserver.org/news/fullstory.php/aid/673/The_brain_drain:_Old_myths,_new_realities.html last accessed on 04/02/2009

		600).	resources is (1 = to invest little in training and employee development, 7 = to invest heavily to attract, train, and retain employees)'	the process by which human capital stock is enhanced by the school system; however this educational process takes place within firms' (1995:1).
	Local Availability of specialised research and training services	World Economic Forum, Global Competitiveness Reports (2005:586).	'In your country, specialized research and training services are (1 = not available, 7 = available from world-class local institutions)'	In line with the view that human capital development entails continuous updating and replacement of depreciated knowledge, availability of specialized research and training services will ensure provision of update knowledge. Trade as a discipline is a highly specialized area which is best provided by specialized institutions which are able to keep track of topical issues in the field. In addition, new issues are continuously being added to the negotiation table. It is unsurprising, therefore, that donors have been involved in supporting trade centres and university departments that offer training in trade-related issues.

3.2 MEASUREMENT OFTRCB

To construct the TRCB indices, this study closely follows the approaches of Wilson, Mann and Otsuki (2003) and Nordàs and Piermartini (2004). Each TRCB indicator is measured by a composite index constructed from variables as indicated above. As noted in the preceding section the data on different indicators chosen for TRCB are captured using different units of measurement. Some are general numbers ranging from zero to many hundreds (e.g. tertiary enrolment, number of administrative procedures required to start a business, number of documents required to export/import, just to name a few) while some are ranks ranging between 1 and 7. Therefore, for modelling purposes the sub-indicators have been put onto a common scale through the steps described below.

Step 1: ***Normalising the data***

As discussed above, TRCB targets are categorised either under Infrastructure (F), Institutions (I), or Human Capital (H). These categories are identified using the sub-indicatorvariables (x_i) listed and explained above. The first step isto make the raw data comparable. The raw data are converted in such a way that they are all consistent with respect to the sign of their expected influence on trade. Variables that are captured as actual values where a low figure is desirable (e.g. number of administrative procedures required to start a business, number of documents required to export / import, etc.) are converted by taking an inverse of all numbers which then converts the series such that increasing numbers are desirable. For all other TRCB sub-indicators that are measured as indices and actual values in which rising numbers are expected to boost trade,(e.g., tertiary enrolment rates), these are normalised using the sample average of all the countries in the survey, to come up with a sub-index (X_{in}).

$$X_{in} = \frac{x_{in}}{\left(\frac{\sum_{n=1}^{N} x_{in}}{N}\right)}$$, where X_{in} denote the sub-index for variable i for county n (n = 1... N).

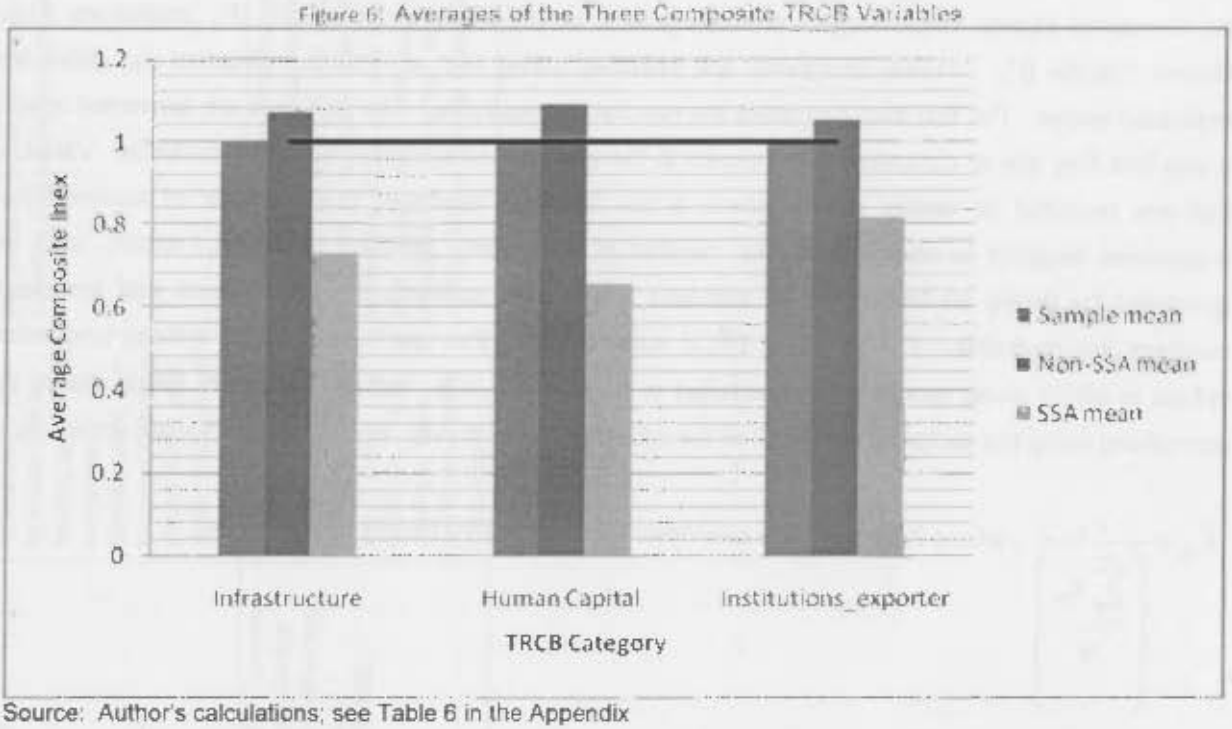
Step 2: ***Composite TRCB indicator***

After normalising all the sub-indicatorvariables, the composite indicator $\overline{X}_{kn}$ where k = F, I, or H for each TRCB indicator in country (n), is calculated as a simple average of the normalised sub-indices.

3.3 DESCRIPTIVE STATISTICAL ANALYSISOF THE DATA

Before looking at the specific empirical analyses conducted to address the aforementioned questions, some descriptive statistics will be provided. It is useful to compare average values of these variables in SSA, non- SSA and the rest of the world, with the aim of exploring the extent to which SSA countries' qualitiesof institutions, human capital and infrastructure depart from world standards. A comparison of average values among these three categories is highlighted in Figure 4 below. The trend line at 1.0 represents the average for all the countries in the sample which is also taken to be the proxy of the world average. It can be seen that in all the three broad TRCB categories non-SSA countries are superior to the world average, while SSA countries lag behind both the world and non-SSA countries.

Figure 6: Averages of the Three Composite TRCB Variables



Source: Author's calculations; see Table 6 in the Appendix

Figure 4shows that on average SSA countries lag behind mainly in the quality of human capital, which shows the greatest difference of approximately 40% to 35% below the non-SSA and sample countries' average standards (see Appendix 6 and 6a). This result seems to lend support to the current focus ofTRCB programmes that emphasize human capacity development. However, despite this major capacity gap between SSA and non-SSA countries, recent empirical literature that has looked at trade effects ofTRCB has not taken human capital into account (Wilson et.al 2003, Jansen and Nordas2004). Again, given the fact that the bulk ofTRCB activities are channelled towards human capacity development we would expect that human capital development would be at the centre of empirical analysis ofTRCB;

Equation 3

$$M_{ij} = \alpha_k Y_i^{\beta_k} Y_j^{\gamma_k} N_i^{\varsigma_k} N_j^{\upsilon_k} D_{ij}^{\sigma_k} \cup_{ijk}$$

Where; M_{ijk} is the value of the flow of good or factor k from country (region) i to country (region) j; Y_i and Y_j are income in country i and j respectfully, N_i and N_j are populations in country i and j; D_{ij} is the distance between countries (regions) i and j and U_{ij} is a log normally distributed error term with $E(U_{ijk}) = 0$.

Recent developments in trade theory have provided theoretical foundations for the gravity model. According to Baldwin and Taglioni (2006), Anderson (1979) was the first to specify clear micro foundations for the gravity equation. 'The cornerstone of Anderson's theory, however, rested on an assumption that was viewed as ad hoc at the time, namely that each nation produces a unique good that is only imperfectly substitutable with other nations' goods (Baldwin and Taglioni 2006:1). This theory was seriously undermined by criticism in the 1970s and 1980s and other explanations were brought forward. Feenstra (2004) uses a monopolistic competition model to explain the theoretical framework of the gravity model. Under the monopolistic model each country exports varieties of differentiated products to the other. $i, j = 1...., C$ is the number of countries linked by common trade rules and preferences. K=1, N is the variety of products available, with each variety counting as a distinct product. Anderson and Van Wincoop (2003a) modify Anderson's (1979) equations, but make use of properties of a full expenditure system and apply it to cross-sectional data. The authors maintain a hypothesis of identical homothetic preferences across regions and assume complete specialization by each country and zero tariff and transport costs. Baldwin and Taglioni (2006) follow and extend the theory of Anderson and Van Wincoop (2003),as outlined below, to accommodate panel data.

The Expenditure System

Assuming a single country exporter from country i to country j, the authors denote the expenditure share identity as follows:

Equation 4

$$P_{ij} x_{ij} = s_{ij} E_j;$$

where x_{ij} the quantity of bilateral exports of a single variety is from country i to country j, P_{ij} is the price of the good inside the importing country, measured in terms of a numeraire, and, therefore $P_{ij} x_{ij}$ is the value of trade flow also measured as a numeraire. E_j is the destination nation's expenditure (again measured in terms of the numeraire) on goods that compete with imports, i.e. tradable goods (Baldwin

and Taglioni, 2006: 3). s_{ij} denotes the fraction of expenditure by country j on its importsof the product produced in country i.

Assuming that expenditure shares depend on relative prices, and adopting a constant elasticity of substitution (CES) demand function, Baldwin and Taglioni (2006) construct the expenditure on the imported good as follows:

Equation 5

$$share_{ij} \equiv \left(\frac{P_{ij}}{P_j}\right)^{1-\sigma}, where \ P_j = \left(\sum_{k=1}^{R} n_k \left(P_{kj}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}}, \ \sigma > 1$$

where $\frac{P_{ij}}{P_j}$ is real price of P_{ij}, P_j is the importing country j's ideal CES price index assuming that all goods are traded, R is the total number of countries from which country j buys (including itself), σ is the elasticity of substitution among all varieties,and n_k is the number of varieties exported from nation k. If equation (8) and (9) are combined we get an import expenditure equation, represented as follows:

Equation 6

$$P_{ij}x_{ij} = \left(\frac{P_{ij}}{\left(\sum_{k=1}^{R} n_k \left(P_{kj}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}}}\right)^{1-\sigma} E_j$$

The landed price in the importing country j can be linked to the production costs in the exporting country i (p_i), the bilateral mark-up (μ), and the bilateral trade costs (τ_{ij}), and is expressed as follows:

$P_{ij} = \mu P_i \tau_{ij}$, assuming $\mu = 1$ (monopolistic or perfect competition conditions).

In line with much of gravity literature, we will model bilateral trade costs as a function of all possible aids and impediments to bilateral trade. Accordingly, τ_{ij} includes 'natural' barriers (bilateral distance, adjacency, land border, etc.), various measures of man-made trade costs (free trade agreements, etc.), and cultural barriers (differences in language, religion, etc.) (Baldwin & Taglioni 2006:6). It is within this framework that institutions, infrastructure and human capital variables are to be included in the gravity model. Following, Melitz (2006), τ_{ij} will take the following form:

Equation 7

$$\tau_{ij} = \prod_{k=1}^{m} (\mu_{ij,k})^{\gamma k} * exp\left(\sum_{k=m+1}^{n} \gamma k \mu_{ij,k} \right)$$

where $[\mu_{ij,k}]k = 1 \ldots n$ represents a vector of n symmetric bilateral trade frictions between i and j, and $[\gamma_k]k = 1..n$ represents the vector of associated elasticities or semi-elasticities.

Equation 8

$$P_{ij} = P_i \tau_{ij}$$

To derive the total bilateral trade exports from country i to country j, we multiply the expenditure share function by the number of symmetric varieties that country i has to offer (n_i). Therefore the total value of trade (V_{ij}) is: $V_{ij} = n_i s_{ij} E_j$. After making necessary substitutions[29] we have the following;

Equation 9

$$V_{ij} = n_i (P_i \tau_{ij})^{1-\sigma} \frac{E_j}{P_j^{1-\sigma}}$$

$$V_{ij} = n_i P_i^{1-\sigma} \tau_{ij}^{1-\sigma} \frac{E_j}{P_j^{1-\sigma}}$$

Equation (9) represents country i's sales to each market. Therefore, summing over all the markets will give us the total income for country i assuming that markets clear. This can be expressed as follows:

Equation 10

$$Y_i = n_i P_i^{1-\delta} \sum_{i=1}^{R} \left[\tau_{ij}^{1-\sigma} \right] \frac{E_j}{P_i^{1-\sigma}}$$

If we combine equations (10) and (9), we get a gravity equation expressed as follows:

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[29] Substitute $\left(\frac{P_{ij}}{P_j} \right)^{1-\sigma}$ for s_{ij} and $P_i \tau_{ij}$ for P_{ij} from equation (9).

Equation 11

$$V_{ij} = \tau_{ij}^{1-\sigma} \frac{Y_i E_j}{P_j^{1-\sigma} \sum_{j=1}^{R} (\tau_{ij}^{1-\sigma} \frac{E_j}{P_j^{1-\sigma}})}, \text{ if we let } \sum_{j=1}^{R} (\tau_{ij}^{1-\sigma} \frac{E_j}{P_j^{1-\sigma}}) = \Omega, \text{ then}$$

$$V_{ij} = \tau_{ij}^{1-\sigma} \frac{Y_i E_j}{\Omega P_j^{1-\sigma}}$$

Equation 11can be made to look more like the classical physics gravity equation as follows:

$$Bilateral\ Trade = G \frac{Y_i Yj}{(dist_{ij})^{\sigma-1}}, \text{ where } G = \frac{1}{\Omega P_j^{1-\sigma}} \text{ and } (dist_{ij})^{\sigma-1} = \frac{1}{\tau_{ij}^{1-\sigma}},$$

Most recent literature has excluded the $\frac{1}{\Omega P^{1-\sigma}}$ component and only estimated the gravity equation represented by $V_{ij} = \frac{Y_i E_j}{\tau_{ij}^{\sigma-1}}$ [30]. The ignored component $\left(\frac{1}{\Omega P^{1-\sigma}}\right)$ includes factors that vary every year such as bilateral costs and GDPs. (See equation (14) above for the definition of Ω). Its exclusion therefore results in omitted variable biases. Baldwin and Taglioni (2006) refer to this as the "gold medal error" in the estimation of the gravity equation. This ignored component is what a and VanWincoop (2003a) calls the 'multilateral trade resistance'.Other literature refers to it as 'remoteness'. The authors note that since $\frac{1}{\Omega P^{1-\sigma}}$ is directly correlated with trade costs (*see equation (11) above*), its exclusion from estimation will bias the trade costs estimates and its determinants, and therefore they recommend use of time-varying country dummies to address the problem. Using the theoretical foundation of the gravity equation Baldwin and Taglioni (2006) identify two other mistakes which they term 'silver and bronze medal errors'. The silver medal mistake occurs when researchers wrongly average the trade flows and make use of arithmetic average(log of sums) instead of geometric average (The gravity equation is modelled within a CES expenditure theoretical framework, and therefore is multiplicative.) This problem of aggregation occurs when authors use trade data from importers and exporters in order to come up with one estimate of bilateral trade. However, the gravity literature has shown a tradition of using only import data because it has long been argued to be more accurate. Other literature has used

[30] Since the contribution of Anderson and van Wincoop (2003), this 'error is now widely recognized and several standard fixes are used to avoid it' (Baldwin & Taglioni, 2006: 11). Common measures that have been used include nation dummies, pair dummies which are time-invariant, and time-varying country dummies.

export data only.This is the approach taken in the present work.Import data is used only as mirror data when export figures are missing. Lastly, the bronze medal mistake stems from 'the incorrect deflation of trade and GDP figures' (Baldwin and Taglioni 2006: 27).

3.4.2 Specificationof the Empirical Model

Previous studies have restricted their analysis to one or another specific TRCB initiative, have narrowly defined TRCB to cover border measures (trade facilitation), and have given limited coverage to African countries. Furthermore, earlier studies have either focused on institutions and trade or infrastructure and trade. Those studies that have extended their analysis to behind the border issues do so with exclusive attention either to institutions or infrastructure. Nor do they attempt comparative analysis of different policy mixes. The present study fills this gap by widening the definition of trade capacity to include factors such as human capacity and other infrastructure factors which constrain supply capacity, and by widening the coverage of countries by including data on many African countries. The study will make use of world data but include a Sub- Sahara Africa (SSA) dummy for SSA countries, excluding South Africa (SA).

Exclusion of SA is motivated by its extreme divergence from the pattern of African economies. By UN classification South Africa is a middle-income country with well developed financial, legal, communications, and energy and transport sectors. Its per capita GDP corrected for purchasing power parity position it as one of the world's fifty wealthiest countries. According to the 2006's Africa Development Report, South Africa's 2004 nominal GDP ($215 billion) accounted for the largest share of Sub-Saharan Africa's nominal GDP.Bogetic and Fedderke(2005) benchmark Saw's infrastructure performance on all four major infrastructure sectors, and find it to be quite comparable with other country groupings in terms of availability, accessibility and affordability.These factors make SA an outlier in its continent. In consequence of the combination of its advanced stage of development and its economic size relative to other African countries, its inclusion would distort the analysis.

To serve the study's objectives, the standard gravity model is augmented to include tariffs, proxies for TRCB initiatives, and dummies for language, regional trade arrangements, common border, and being landlocked. The specification is as follows:

Equation 12

$$\begin{aligned} InT_{ij} &= \alpha_0 + b_1 \ln(1 + TARIFF_{ij}) + b_2 \ln H_i + b_3 \ln F_i + b_4 \ln I_i + b_5 \ln H_j + b_6 \ln F_j \\ &+ b_7 \ln I_j + b_8 \ln(GDP_i) + b_9 \ln(GDP_j) + b_{10} POP_i + b_{11} POP_j + b_{12} SSA_{ij} + b_{13} \ln(DIST_{ij}) \\ &+ b_{14} LOCK_{ij} + b_{15} BORD_{ij} + b_{16} RTA_{ij} + b_{17} LANG_{ij} + b_{18} Col_{ij} + b_{19} BILATERAL_{ij} \\ &+ b_{20} SSA + \varepsilon'_{ji} \end{aligned}$$

The gravity model variables and their expected signs are described in Table 7below.

Table 7: Variables used in the gravity model.

Variable	Description	Expected sign
T_{ij}	Is the value of total exports from country i to country j with imports of country j from i used as a mirror for missing data.[31]	Dependent Variable
$TARIFF'$	Simple Average MFN applied	-
I_j, F_j, H_j	These are importing country's indicators for quality of institutions, infrastructure and human capital respectively	+
I_i, F_i, H_i	These are exporting country's indicators for quality of institutions, infrastructure and human capital respectively	+
GDP	Is the Gross Domestic Product	+
Pop	Total population of a country in millions	+
$DIST_{ij}$	Is the geographical distance between capital cities of the importing and exporting countries.	-
Rel_{ij}	This is the conditional probability that two randomly drawn persons one from country J and I share the same religion.	+
Dummy variables		
(a) SSA_{ij}	1 if either the exporting or importing country belongs to the SSA region (excluding South Africa) and 0 otherwise;	-
BORD	1 if i country and j share a land border and 0 otherwise.	+
LOCK	1 if the exporting country is land locked and 0 otherwise	-
Regional Trade Agreement[32]	1 if i and j belong to the same regional trade agreement and 0 otherwise (several regional groupings are included)	+
Bilateral	1 if i and j have a bilateral trade agreement and 0 otherwise	+
LANG	1 if country i and j share a common official language and 0 otherwise	+
Col	1 if i ever colonized j or vice versa, and 0 otherwise	+
ε_{ij}	This is an error term which is assumed to be well-behaved and captures all other omitted trade effects.	

Inclusion of both exporters' and importers'TRCB variables is due to the fact that a country will export more not only due to its own reforms, but because of reforms undertaken by its trading partners (WMO, 2004). The impact ofTRCB is isolated by including dummies as control variables to capture the effect of some similarities such as preferential trade agreements, adjacency, colonial ties, similar religion and languages. The model is estimated using 2005 cross-section data for 117 countries of which 24 are in sub-Sahara Africa.

[31] We follow other work such as Wilson, Mann and Otsuki (2003 and 2005), Gamberoni and Newfarmer (2009) and Freund and Rocha (2010) among others that have used exports. We note, however, that other literature has used imports (Nordas and Piermartini 2004) while still other studies have used averages of exports and imports. There are various arguments around which of these approaches is best. Some data may involve under-reporting of imports so as to avoid duty; at the same time there is a widespread view that export data reported by developing countries are generally of poor quality. However, these are issues that can be investigated further through estimating specifications using import data and testing for statistical differences in coefficients.

[32] Regional trade agreements included are SADC non SACU, NAFTA, EU, GAFTA, ASEAN, CACAM, CARICOM, CEFTA, ECOWAS, COMESA, EU, MERCOSUR, NAFTA, EFTA, CIS, SAPTA, SADC, and SACU.

As noted previously, discussions by Wei (1996), Deardorff (1998), Anderson and van Wincoop (2003a) andBaldwin & Taglioni (2006) highlight the possibility of misspecification in the standard gravity model due to exclusion ofthe multilateral resistance or remoteness term[33]. Ever since the contribution of Anderson and van Wincoop (2003a) most authors have included country-fixed effects for both exporting and importing countries in the empirical specification and estimation of the gravity equations. Inclusion of country-fixed effects in our model does not permit us to assess the impact of country specific variables such as institutions, infrastructure and human capital on trade, as these become impossible to isolate once country fixed effects are incorporated. We therefore follow some other empirical literature that has resorted to explicitly computing and including a remoteness variable in the specification of the gravity equation[34]. Different proxies have been used to capture remoteness, with some studies using weighted distance to all other trade partners, while others have used latitude, which is the distance from the equator[35]. The more remote are the two trading countries from their other partners, the more they are likely to trade with each other. According to Melitz (2007), remote countries have fewer good opportunities. Sachs & Warner (1997) and Rodriquez & Rodrik (1999) use distance from the tropics as an indication of harshness of environment and resource endowment in their growth studies. Melitz (2007) cites other previous studies (Frankel 1997, Wolf 1997, Helliwell 1998,Nitsch 2000),which have included remoteness and have ignored country fixed effects because of high (and sometimes perfect) correlation between remoteness and internal distance and country fixed effects. Feenstra (2004: 5-35) shows that results from both approaches (i.e. using fixed effects and includinga remoteness variable in the specification) yield quite similar and consistent estimates, although multilateral resistance terms resulted in more efficient estimates. Nordàs and Permartini (2004) also come to thisconclusion.

The specification of our equation including remoteness variables[36] is as follows:

Equation 13

$$\begin{aligned} InT_{ij}^{t} = {} & \alpha_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln Dist_{ij} + b_4 SSA + b_5 \ln(1+TARIFF_i) + b_6 \ln(1+TARIFF_j) \\ & + b_7 \ln H_i + b_8 \ln F_i + b_9 \ln I_i + b_{10} \ln H_j + b_{11} \ln F_j + b_{12} \ln I_j + b_{13} POP_i + b_{14} POP_j + b_{15} RTA \\ & + b_{16} BILATERAL_{ij} + b_{17} LOCK + b_{18} BORD + + b_{19} LANG + b_{20} Col + b_{21} \ln lat\_\exp + b_{22} \ln lat\_imp + \varepsilon_{ji}^{t} \end{aligned}$$

Within the fixed effects model which includes both exporter and importer fixed effects our estimation equation is specified as follows:

[33] See the discussion in the theoretical framework above.

[34] Remoteness has been defined as a country's market potential. 'To illustrate the role of remoteness, consider two pairs of countries, (i, j) and (k, l), and assume that the distance between the countries in each pair is the same ($D_{ij}=D_{kl}$) but l and j are closer to other countries. In this case, the most remote countries, k and l, will tend to trade more between each other because they do not have alternative trading partners' (Santos Silva and Tenreyro, 2006: 651). Helble (2005) gives an example of the distance between Spain and Sweden which is about the same as the distance between Australia and New Zealand but because of the remoteness of Australia and New Zealand from other markets they are expected to trade more with each other than Spain and Sweden

[35] e.g. Nord às and Piermartini, (2004) used absolute latitude of the two trading partners.

[36] We use the absolute latitude of a country.

Equation 14

$$InT_{ij} = \alpha_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln Dist_{ij} + b_4 SSA + b_5 \ln(1 + TARIFF_i) + b_6 \ln(1 + TARIFF_j) + b_7 \ln H_i + b_8 \ln F_i + b_9 \ln I_i + b_{10} \ln H_j + b_{11} \ln F_j + b_{12} \ln I_j + b_{13} POP_i + b_{14} POP_j + b_{15} RTA + b_{16} BILATER + b_{11} LOCK + b_{18} BORD + + b_{19} LANG + b_{20} Col + b_{21} \sum D_i + b_{22} \sum D_j + \varepsilon'_{ij}$$

where D_i and D_j capture exporter's and importer's fixed effects respectively.

3.4.3 Control for Sample Selection Bias

Other recent research usingthe gravity model focuses on the problem of zero bilateral trade flows – a problem that appears most starkly in the basic log-linear gravity model sketched above. A potential sample selection problem arisesfrom the fact that T'_{ij} is observed only for countries which trade with each other. This implies that bilateral trading partners are non-random, and hence not representative of all countries. Trading countries are divided into two groups, one group consisting of X_1 countries for which we have all the information on both regressors and regressand (trade flows), and the second group consistingof X_2 countries for which we have information on only regressors but not on the regressand (trade flows). Can we therefore estimate the gravity model using only X_1 countries and ignoring the X_2? The omission of zero observations represents a non-random screening of the data that may lead to biased or inconsistent estimates. According to Green (1981) (cited in Coe et al, 2002) the size of bias if variables are normally distributed is inversely proportional to the share of the sample size included in the regression, implying that the smaller the share of observation the greater the bias. Gujarati (2003) also notes that OLS estimates of parameters obtained from estimating X_1 observations will be biased and inconsistent. However, estimating the model using all the observations will also encounter an estimation problem since the conventional log-linear formulation of the gravity equation is incompatible with the inclusion ofzeros in the trade data (since the logarithm of zero is undefined.)

To address the problem, a majority of empirical studies have simply dropped pairs with zero trade from the data set while other authors have substituted zero values by an arbitrarily chosen small constant (usually 1) and hence estimated the model using $\ln(T_{ij} + 1)$ as the dependent variable instead of $\ln(T_{ij})$. Some recent literature (suchas Rose (2004) and Anderson and Marcouiller (2002)) has estimated the gravity equation using the censored regression model (Tobit estimator). 'The Tobit model describes a situation in which part of the observations on the dependent variable is censored (unobservable) and represented instead by mapping them to a specific value, generally zero' (Linders and de Groot, 2006: 4). Heckman (1979) showed that this selection bias problem reduces to the omitted variable problem, and he therefore proposes inclusion of appropriate conditioning variables which determine the participation probability.

Helpman, Melitz and Rubestein(2006) adopts a two-step procedure proposed by Heckman(1979) to address the problem of zero trade, and this is the approach taken in the present study. Step 1 of the procedure is to estimate a probit model that estimates the probability that a country pair engages in trade. The argument here is that there are some variables or characteristics which influence countries' decisions on whether or not to trade with each other but does not affect the volume oftheir trade. In the second step the standard gravity model is then estimated by adding to it a variable (called the inverse Mills ratio or the hazard rate) that is derived from the probit estimate (Gujarati 2003). The implication is that sample selection bias is corrected by including an estimate of the missing variables (determinants of the trade decision) in the specification of the bilateral trade flows.

Heckman's two-step Heckit procedure we use is based on following two latent variable sub-models:

$$y_1 = \alpha X + \mu_1 \quad \text{(i)}$$

$$y_2 = 1[\delta Z + \mu_2 > 0] \quad \text{(ii)}$$

where y_2 is the binary trade flow indicator, which takes the value of 1 if trade occurs and 0 otherwise.

Assumptions

a. X, Z, y_2 are always observed. y_1 is observed only when $y_2 = 1$[37];

b. (μ_1, μ_2) are error terms which are jointly normally distributed, independent of X and Z, with zero expectation,

c. μ_2~Normal (0,1)

Equation (i) shows how the value of exports is influenced by different factors affecting bilateral trade. Equation (ii) is the selection equation and it 'gives some insight into why trade occurs at all between two partner countries' (Francois and Manchin, 2006: 10)

Following Wooldridge (2004: 563), 'since y_1 is observed only when $y_2 = 1$, what we hope to estimate is $E(y_1|X, y_2 = 1)$ along with $P(y_2 = 1|X)$.'[38]

Procedure

a. Using all N observations in the sample obtain the probit estimate $\hat{\delta}$ from the equation $P(y_2 = 1|\mathbf{X}_i) = \delta X + \mu_2$ (iii); where the X variables are the gravity model variables explained above. After getting the results we compute the selection correction term (inverse Mills ratio) $\hat{\lambda} \equiv \lambda(X_i \hat{\delta})$, at least for i=1,2,....N; which is then included as an additional regressor in the gravity equation.

b. Obtain $\hat{\beta}_1$ and $\hat{\gamma}_1$ from the OLS regression on the selected sample,

[37] Country pairs have to make the decision to trade first for bilateral trade flows between them to be observed.

[38] Wooldridge provides a full derivation of how $E(y_1|\mathbf{X}, y_2 = 1)$ depend on the vector of interest β_1.

y_{i1} on $\mathbf{X_{i1}}$, $\hat{\lambda}$: $i = 1,2,.....N_1$ (iv)

These estimators are consistent and $\sqrt{N}$ - asymptotically normal (Wooldridge, 2001: 563).

Therefore for the sample selection model the following is specified

Equation 15

$$InT_{ij} = \alpha_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln Dist_{ij} + b_4 SSA + b_5 \ln(1 + TARIFF_i) + b_6 \ln(1 + TARIFF_j) + b_7 \ln H_i + b_8 \ln F_i + b_9 \ln I_i + b_{10} \ln H_j + b_{11} \ln F_j + b_{12} \ln I_j + b_{13} POP_i + b_{14} POP_j + b_{15} RTA + b_{16} LOCK + b_{17} BORD + + b_{18} LANG + \varepsilon_{JI}$$

and for the selection equation we assume that y_1 is observed when we have:

Equation 16

$$InT_{ij} = \alpha_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln Dist_{ij} + b_4 SSA + b_5 \ln(1 + TARIFF_i) + b_6 \ln(1 + TARIFF_j) + b_7 \ln H_i + b_8 \ln F_i + b_9 \ln I_i + b_{10} \ln H_j + b_{11} \ln F_j + b_{12} \ln I_j + b_{13} POP_i + b_{14} POP_j + b_{15} RTA + b_{16} LOCK + b_{17} BORD + + b_{18} LANG + b_{19} Col + b_{20} \mathrm{Rel} + \varepsilon'_{JI}$$

In this selection equation, religion (Rel) is used as an identification variable, following Helpman *et al* (2006). They define the common religion variable as the probability that two randomly drawn persons, one from each country, share the same religion[39]. They find empirically that shared religion significantly affects the probability that two countries engage in trade but has a negligible effect on trade volumes.

Finally, we estimate equation (17) below (where "ST", the selectivity term is included as an additional variable).

Equation 17

$$InT_{ij} = \alpha_0 + b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln Dist_{ij} + b_4 SSA + b_5 \ln(1 + TARIFF_i) + b_6 \ln(1 + TARIFF_j) + b_7 \ln H_i + b_8 \ln F_i + b_9 \ln I_i + b_{10} \ln H_j + b_{11} \ln F_j + b_{12} \ln I_j + b_{13} POP_i + b_{14} POP_j + b_{15} RTA + b_{16} LOCK + b_{17} BORD + + b_{18} LANG + b_{19} Col + b_{20} ST + \varepsilon'_{JI}$$

In order to test the stability of our results we undertake robustness tests. The gravity model is then estimated using different constructions of the composite indices. To do this we follow the approach of Francois and Manchin (2007), and regress the indices ofTRCB on gross domestic product and

[39] "For example if country A has 40 percent Christians and country B has 20 percent, we obtain 0.08" (Helble, 2005, p.16

population. We then take the residuals as representative of deviations from income conditional expected values for each of the three indices and use them in Equation 18.

Equation 18

$$\ln Index_{TRCBt} = \alpha_0 + \alpha_1 \ln GDP_{it} + \ln POP_{it} + e_{it}$$

Adopting this methodology ensures that we are no longer comparing countries at different levels of development, and secondly helps us correct the likely multicollinearity problem because the proxies ofTRCB are dependent on level of income. It is however, worthy noting that apart from averaging primary variables into aggregate indicators as done in this thesis there other approaches that have been used to deal with the likely problem of multicolinearity within sub-components that arises when choosing indicators from broad variables. Francois and Manchin (2007) employ principal component analysis to constructinstitutional and infrastructure measuresbased on the first two components of each aspect. According to Vyas and Kumaranaye (2006:460) this is "a multivariate statistical technique used to reduce the number of variables in a data set into smaller number of 'dimensions'". Portugal-Perez and Wilson (2010:3) make use of factor analysis,a modelling technique that explains the correlation among a set of observed variables through an unobserved common factor.Apart from this thesis, averaging of sub-indicators has also been applied by Wilson, Mann and Otsuki (2003, 2005). All these approaches (simple average, principal component analysis and factor analysis) are ways of reducing the dimensionality of the data by aggregating highly correlated indicators into a single indicator. The major difference between the approach adopted in this thesis (averaging sub-indicators) and the other two is the assumption made about the weights assigned to individual sub-components. In taking a simple average, we are implicitly assuming equal weights (which is a potential weakness of the approach) for all sub-indicators whereas some other approaches calculate weights.

We further compare our results with those obtained from alternative ways of dealing with zero trade values. In this case we first estimate the gravity model using the Tobit estimation and secondly we drop the pairs with zero trade from the data set and estimate the log linearity by OLS and compare the results. In addition we explore the issue of complementarity of policies by introducing interaction terms of our TRCB indicators.

We also test the sensitivity of the results to trade flows according to geographical partner. For example, we compare SSA flows with developed and with developing regions.

While the estimated coefficients give us different partial impacts of our explanatory variables on trade, they do not directly give us the opportunity cost ofTRCB indicators. To be able to evaluate this we follow Wilson et. al's (2003) approach and make use of policy simulations. We examine scenarios that focus on improved institutions, infrastructure and human trade-related capacity in Sub-Sahara Africa and compare

these with matched conditions for the rest of the world. In these policy simulations, the world's average level is used as the baseline for each of the composite indicators.

3.5 EMPIRICAL ANALYSIS

In the following sub-sections a number of research questions posed earlier are answered through an estimation of the Heckman two-step model.

3.5.1 Does TRCB Matter in Determining Trade Flows?

Given the limited availability of donor funds, TRCB resources should be prioritized in such a way as to produce greatest benefit. This section aims to shed light on the relative importance ofTRCB in the determination of bilateral trade flows. To examine more rigorously the extent to which trade-related capacity building indicators impact on bilateral trade flows, a gravity equation for bilateral trade was estimated using trade patterns in 2005. As indicated earlier, the data were obtained from the UN COMTRADE database, the World Bank's Doing Business Report, and the World Economic Forum's Competitiveness survey (2005, 2006), among other sources[40]. The decision to make use of cross-sectional datawas based partly on the fact that the main variables of interest do not vary greatly on a year-to- year basis. Therefore cross sectional variations among countries in these variables should account for any differences they generate in bilateral trade flows. We use the following standard gravity model in our estimation, where the variables are described in detail in Table Appendix 5:

Equation 19

$$
\begin{aligned}
In(T_{ij}) = \alpha_0 &+ b_1 \ln(GDP_i) + b_2 \ln(GDP_j) + b_3 \ln(POP_i) + b_4 \ln(POP_j) + b_5 \ln(1 + TARIFF_i) \\
&+ b_6 \ln(1 + TARIFF_j) + b_7 \ln(DIST_{ij}) + b_8 \ln(Human_i) + b_9 \ln(Infra_i) + b_{10} \ln(Inst_i) \\
&+ b_{11} \ln(Human_j) + b_{12} \ln(Infra_j) + b_{13} \ln(Inst_j) + b_{14} LOCK_i + b_{15} BORD_{ij} \\
&+ b_{16} Comlang\_off_{ij} + b_{17} Col_{ij} + b_{18} SSA + b_{19} RTA_{ij} + b_{20} BILATERAL_{ij} + b_{21} ST + \varepsilon_{ij}
\end{aligned}
$$

We extend the model to include trade related capacity building indicators, and tariffs. Following WMO (2005) we use the TRCB indicators to capture unobserved country specific effects for both exporters and importers. An extended gravity equation that excludes all TRCB variables was first estimated using Heckman's two-step selection model. Table 8 below presents the estimation results[41]. These jointly estimate a selection equation which determines the probability that two countries engage in trade (Probit equation).A regression model determines the bilateral trade flows. The selection equation uses the same explanatory variables as the regression equation,along with at least one identification variable.Following

[40] Appendix 5 give a full description of variables used in this thesis and their data sources.
[41] The table only reports results for the regression equation. Selection results for specifications 1-4 are available from the author upon request.

Helpman*et al* (2006)we use religion as the variable in question. To justify this choice, we estimate both the regression and probit equations separately using standard gravity variables and common religion. Our findings show that the religion variable is not a significant variable in the trade flow regression equation but positively and significantly determines the probability that two countries will engage in trade *(see results in Appendix 7)*. This forms the basis for omitting the common religion variable from the main regression equation and for its use as a selection variable in the selection equation. The first column of results in Table 1 below presents the standard gravity equation augmented by a number of dummies capturing membership in a common regional trade agreement, common official language, and existence of colonial ties, among others.

Table 8. Regressions Results

Dependant Variable: Log Export Value (SUS)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
Logtariff_imp			-0.507***	0.054	-0.473***	0.055	-0.489***	0.054	-0.470***	0.053	-0.470***	0.053
Logtariff_exp			-0.583***	0.055	-0.503***	0.055	-0.514***	0.054	-0.502***	0.054	-0.505***	0.054
Loggdp_imp	0.962***	0.020	0.842***	0.023	0.704***	0.027	0.750***	0.034	0.610***	0.029	0.664***	0.034
Loggdp_exp	1.304***	0.020	1.168***	0.023	0.934***	0.027	0.689***	0.033	0.689***	0.029	0.581***	0.033
Logpop_imp	0.039*	0.020	0.180***	0.024	0.292***	0.029	0.252***	0.031	0.337***	0.028	0.299***	0.031
Logpop_exp	0.003	0.019	0.163***	0.024	0.355***	0.029	0.525***	0.031	0.492***	0.028	0.573***	0.032
logdist	-1.094***	0.036	-1.128***	0.036	-1.151**	0.036	-1.155**	0.035	-1.158**	0.035	-1.162**	0.035
Loginst_imp					0.812***	0.141					0.088	0.175
Loginst_exp					1.642***	0.156					-0.524***	0.187
Loghuman_imp							0.661***	0.152			-0.518***	0.201
Loghuman_exp							2.772***	0.156			1.439***	0.196
Loginfra_imp									1.675***	0.158	1.956***	0.204
Loginfra_exp									3.395***	0.167	2.864***	0.213
dcomlang_off			0.870***	0.075	0.741***	0.073	0.882***	0.074	0.814***	0.073	0.845***	0.071
dssa	-0.514***		-0.412***	0.060	-0.540***	0.062	-0.318***	0.059	-0.367***	0.058	-0.323***	0.063
dlocked	-0.065	0.063	-0.054	0.062	-0.0224	0.061	-0.067	0.061	-0.035	0.060	-0.006	0.059
dcolony	0.469***	0.162	0.522***	0.162	0.574***	0.161	0.515***	0.159	0.607***	0.158	0.589***	0.157
dborder	0.825***	0.153	0.816***	0.152	0.859***	0.151	0.820***	0.149	0.850***	0.148	0.841***	0.147
dac	1.043**	0.508	1.270**	0.505	1.675**	0.505	1.392**	0.497	1.724**	0.494	1.661**	0.493
dgafta	0.580	0.504	1.198**	0.503	1.220**	0.502	1.120**	0.495	0.707**	0.492	0.710	0.490
dasean	2.540***	0.358	2.045***	0.358	1.770***	0.357	1.693***	0.353	1.675***	0.350	1.644***	0.349
dcacam	2.467***	0.538	1.924***	0.536	1.919***	0.535	1.967***	0.528	2.236***	0.524	2.223***	0.522
dcaricom	5.428***	0.915	5.610***	0.910	5.486***	0.907	5.486***	0.907	6.060***	0.890	6.222***	0.886
dcefta	0.978***	0.232	0.620***	0.232	0.727***	0.232	0.878***	0.230	-0.849***	0.228	0.891***	0.227
decowas	1.193***	0.415	1.125***	0.412	0.833***	0.410	0.978**	0.405	0.951**	0.401	0.971**	0.401
dcomesa	1.208***	0.229	1.016***	0.228	0.763***	0.226	1.095***	0.225	0.902***	0.222	0.974***	0.222
dmercosur	1.469**	0.655	1.710**	0.652	2.001**	0.651	1.574**	0.642	1.929**	0.637	1.822**	0.635
dcis	2.767***	0.326	2.338***	0.326	2.243***	0.324	2.176***	0.320	2.110***	0.318	2.094***	0.316
dsacu	1.055	0.798	1.103	0.793	1.258	0.789	1.50*	0.780	1.50*	0.749	0.773	0.771
dbilateral	0.222**	0.091	0.375**	0.091	0.316**	0.091	0.283***	0.090	0.224**	0.089	0.219***	0.089
Mills lambda	0.071	0.217	-0.408*	0.218	-0.681***	0.204	-0.405*	0.215	-0.620*	0.209	-0.548***	0.197
Number of obs	12621		12621				12621	12621	12621		12621	
Censored obs	1726		1726		1726	1726		1726	1726		1726	

Notes:

*, ** and *** denote significance at the 10, 5 and 1 percent level, respectively.

Insignificant regional trade agreements have not been reported in the table of results as well as the constant for space reasons.

Model 1 estimates the gravity equation without all TRCB variables and tariffs.Then in model 2 importer's and exporter's simple average tariff ratesare added into the equation. Models 3, 4 and 5 estimate TRCB variables individually while in model 6 we enter the different categories ofTRCB simultaneously. Results show that an increase in tariffs (for either the importing or exporting country) has a negative effect on exports, in conformity to theoretical expectations. The finding on tariffs is robust to changes in model specification. Also, in line with other gravity model studies of bilateral trade we find that increases in GDP of the importer or the exporter positively and significantly affect trade:a 1% increase in exporter GDP raises bilateral trade on average by about 1.3%, while raising the GDP of the importing country by 1 per cent increases trade volume (less than proportionately) by about 0.99 per cent. We note that before tariffs are included importers have approximately unity elasticity, which is reduced by inclusion of tariffs. Inclusion of tariff variables improves the explanatory power of population variables (both importer's and exporter's) which are now significant at 1 percent level of significance. The impact of the border dummy is also slightly improved when tariffs and TRCB variables are included in the regression equation.This is probably pointing to theborder variable capturing the trade opportunities available to bordering countries, which are better accounted for by trade policy (tariffs). While most papers do not include tariffs in their analysis, our results show that omission of tariffs may result in omitted variable biases.The sample of countries used in the data does not representa free trading block, so its members do not have harmonized tariff policies. Therefore omission of tariffs would result in an upward bias of the coefficients of GDP.Of interest to our hypothesis testing is the coefficient on the SSA dummy which is estimated to be negative and significant at 1% percent level. The implication of the results is that SSA countries' trade with the rest of the world is approximately 34%[42] less than other countries as a function of their 'being African'; see further explaination in Section 3.5.8.

Model 6 shows results in which all the three TRCB variables have been included. The full two-step selection results of the model are presented in Appendix 9.The results show that the same variables explain both the trade volumes and the probability that country i exports to country j. In almost all cases the impact goes in the same direction with the exception of the effect of tariffs, population and common border. Both importers' and exporters' tariffs reduce the volume of trade but increase the probability of trading.A common border raises trade volumes but reduces the probability of trading. Helpman (2006) attributes this counterintuitive finding to the effectsof territorial border conflicts. Both exporter and importer GDP still yield strong results with very high significance levels. However, inclusion ofTRCB variables in the gravity model reduces the impact of exporter GDP by 50%.The elasticity drops from 1.2% to 0.6%. A main insight from these results is that once all the three TRCBindicators are controlled there is considerable variation in the marginal impact ofTRCB variables.This is what we expected, and is crucial

[42] =(EXP(-0.412)-1)*100

for policy analysis and simulations. The results also show a higher magnitude for the exporters' TRCB indices, indicating the importance of country's own trade related capacity building in improving export performance. Despite the counterintuitive sign on exporters' institutions the results in model 6 do highlight the importance ofTRCB in determining trade flows.

3.5.2 Role of Institutions

We estimate a third specification (model 3) in which the standard gravity model controls for institutions only. In this estimation coefficients on institutions are intuitively signed and significant. A 10% improvement in the quality of institutions will see exporters increasing trade by about 16%, while importers will increase by 8%. Quite surprising, though, is the increase in the point estimate of the SSA dummy. Once we control for human capital and infrastructure, the institution coefficient on the exporters' institutions is counterintuitive as it becomes negative and significant, while the coefficient on the importers' institutions is positive and insignificant. This finding on institutions is quite surprising; we expected the institution coefficient to be positive with very high significance levels,in light of the recent emphasis in theoretical development literature and in policy studies. According to Easterly (2001), repeated failures of development approaches derived from neoclassical theory recurrently result from ineffective institutions of any country, which vary from country to country. This could be the reason the institutions variable, which is a composite index of various different sub-indicators, is not behaving as expected. In addition, according to Jansen and Nordas (2004), lack of robustness of the institutions variable might indicate that institutions matter less to foreign trade than they do to direct foreign investment where more commitment and sunk costs are involved. Foreign markets can be serviced through exports and foreign direct investment (FDI); therefore, to access economies with poor institutions investors rely more on exports than on FDI. This proposition supports the negative and significant relationship between exporters' institutions and bilateral trade flows revealed in our results

It must be noted that, compared to literature on institutions and growth there is little research so far on the impact of institutions on trade, hence the scarcity of theoretical arguments linking institutions and trade. However, economic development practitioners have argued that it is institutions in trading partners that matter in determining bilateral trade flows, with similarity of institutions predicting larger flows. The rationale is that institutional similarity both reflects and promotes familiarity of cultural norms and business practices. Linder (1961) was the first to introduce similarity between countries as abooster of trade, though his explanation was based on demand. More recently the argument is that similarity among rich countries goes beyond demand but also entails similarity of institutions. de Groot et.al (*working paper)* using 1998 data of OECD countries attributes the disproportionate trade among OECD members to similarity and high quality of institutions. Our presumption is that countries with similar institutions will trade more as institutional homogeneity will reduce transaction costs between them. We therefore extend

the gravity equation with a variable to reflect the effect of institutional homogeneity. To get this variable to reflect institutional similarity we take deviations between the log ofexporters and importers indicesof institutional quality. The smaller the deviation the more homogenous is the quality of institutions between the two trading partners. Once similarity of institutional quality is controlled for, we observe that institutions become intuitively signed and very significant (*Results are reported in Appendix 9).* The results show a negative and very significant relationship between bilateral flows and differences in institutional quality. According to the results a 10% increase in the gap in institutional quality between trading partners will depress bilateral trade flows between them by about 3%.[43] Controlling for institutional homogeneity in model 3 (where only institutions are controlled for)also results in a lower point estimate[44]of the SSA dummy. These findings lend credence to the view that the marginalization of SSA from the multilateral trading system is partly due to its institutional divergence from the rest of the world, implying, therefore, that SSA will trade more with the rest of the world if institutional differences are reduced. However, this is an area which requires further research to determine minimum levels of institutions required for trade to take place. This is particularly so given the institutional homogeneity among Sub-Saharan African countries (similarity in the poor quality of their institutions) thatmight be predicted, to increase trade among them but has notyet done so.

To explore in detail the institutional impact on bilateral trade flows we estimate our regression model using individual components of the institution index. The results are summarized in Appendix 8 and they reveal different institutional capacity building needs between importing and exporting countries. However, not all of the individual components are significant and have the expected signs – this might be an indication that the proxies used to capture institutions may not be the appropriate ones or the quality of data is poor. We therefore focus on those components that are intuitive. According to the results,for exporting countries to boost bilateral trade flows they requirethe presence of demanding regulatory standards and university/industry research collaboration. Results show that a 10% improvement in standards on products and services by exporters will boost bilateral trade flows by approximately 17%, while similar improvement in the collaboration in research between industry and local universities – or whatever basket of institutional changes this proxies – will result in about a 4% increase in bilateral trade flows. Findings on the importance of standards to exporters is in line with current world developments, in which technical regulations and standards issues are increasingly becoming vital following the continued decline in tariff barriers. It is increasingly difficult for companies to sell in foreign markets when national and international standards are very divergent. This has prompted many countries to adopt policies aimed at enhancing international harmonization.

[43] de Groot et.al (2004) report a similar finding.
[44] -0.35 compared to -0.54 when only the quality of institutions is controlled for.

It is possible that the institutions index does poorly in the regressions due to a potential endogeneity problem astrade leads to convergence of institutions. Countries may have high quality institutions because they trade more rather than the other way round. Some authors have argued that competition through foreign trade cleans up institutional deficits (Ades and Di Tella 1999, Anderson and van Wincoop 2003a, and Acemoglu, Johnson and Robinson2005). Freund and Rocha (2010:3) have tried to address the possibility that more trade leads to improved trade facilitation by examining the effect of trade facilitation on trade in new products, arguing that new products have no impact on the historical development of trade facilitation infrastructure and bereaucracy. Secondly, these authors make use of an instrumental variable approach and examine the impact of requirements in transit countries on exports from landlocked countries, the rationale being that trade facilitation in the transit country is exogenous to the landlocked country. The authors find that coefficients of their variables fall considerably when trade in new products is used to address the endogeneity problem. All the different ways to examine the effects of various trade delays on trade flows used in Freund and Rocha (2010) confirms the importance of trade facilitation in stimulating trade in Africa. Djankov et al (2006) examine the time costs on volumes of exports; and also note the possibility of double causation whereby trade may also affect trade facilitation. This is particularly plausible given that the marginal value of investing in trade facilitation is higher when trade volumes are high. To address this potential endogeneity problem the authors use the number of required signatures for exports to take place and number of signatures for imports to take place as instruments for trading time. The intuition here is that bureaucratic processes directly affect the number of days for export processing, but are unlikely to be affected by the total volume of trade. Overall, their general finding is that increase in trading time reduces trade flows; and using instrumental variables increases the coefficient on trading time slightly. It is possible that, in the absence of an appropriate instrumental variable the actualimpact of institutions on trade might not be properly accounted for and there could be some biases in the coefficients.The authors also use a 'difference-in-difference' technique to address endogeneity issues and evaluate the effect of time delays on the relative exports of countries with similar endowments and geography, and which face the same tariffs in importing countries (Djankov et al, 2006:3).Portugal-Perez, Alberto and Wilson (2010),who estimate the impact of aggregate indicators of "soft" and "hard" infrastructure on the export performance of developing countries, address potentialreverse causality in three ways. Firstly they employ an approach adopted by Francois and Manchini (2007) and regress trade facilitation on income per capita and population and then use the unexplained residuals to proxy for the trade facilitation indicators.Secondly, trade facilitation indicators are instrumented by their 3-year lagged value. Lastly, they examine effects of trade facilitation indicators on new products.

From our analysis it is not far fetched to conclude that, institutions are highly complicated and inter-country differences in economic and social structures, property rights, rule of law and so on rule out any parsimonious account of institutions that influence trade flows in SSA. However, some generalizations can be made although their individual weights will vary different national contexts. For example, property rights and efficiency of the legal system vary widely, but the general principle is that property rights must be secure, transparent and enforceable by law (UNCTAD 2009).

3.5.3 Role of Human Capital

Model 4 controls for human capital only and results reveal that the quality of human capital variable has different impactson importers and exporters, and is also less significant to importers than to exporters. A 1% improvement in the quality of human capital is estimated to boost exporters' trade flows by approximately 2.8%. When other TRCB indicators are controlled for importers' human capital quality has a negative and significant effect on bilateral trade: a 1 percent improvement in the quality of human capital in an importing country will result in approximately 0.5 percent decrease in its imports. We expect this to be the case, assuming that as countries develop their human capital more they can produce more (especially intermediate inputs). Therefore, this increase in the range of consumption and investment goods produced domestically will translate to fewer imports. This assumption is based on the empirically documented understanding that in the early stages of development which are also associated with low quality of human capital, economies rely more on imports especially for manufactured intermediate goods. We therefore expect the effect to be greater for imported manufactured intermediate goods than for primary goods. This hypothesis can be tested by estimating the differential impact of human capital on different classes ofexports, i.e. primary and manufactured exports. Our estimation using manufactured exports supports this speculation, and shows that a 1% improvement in the quality of human capital now results in a greater and more significant decrease in the imports of manufactured goods (1.2%, more than double the 0.5% decline in the total exports equation). The differential impact of human capital on imports of primary goods becomes very small (0.01%) and insignificant when we use primary exports in our estimation[45]. In line with this finding, Wood & Mayer (2001) also find that Africa's export structure is caused by a combination of low levels of education and abundant resources – and they conclude that achievement of high skill per worker could shift comparative advantage into manufactures and services.

[45] Results of the differential impact of human capital on different classes of exports are not reported here, but are available from the author on request. I recognize, however, the importance of pursuing investigation along those lines given the dominant position of natural resources in African exports.

On the other hand, quality of exporters' human capital enhances bilateral trade – a 1 percent improvement in human capital quality will boost exports by about 1.4%. We expected this kind of relationship given that as human capacities increase economies are better placed to produce more and hence export more; this could be a specifically African scenario given the production constraints faced by African countries. Otherwise for developed countries we see increase in both exports and imports.. Empirically it has been shown that economic activity is positively related to exports. Compared to results for model 3 (with institutions only), model 5 (with infrastructure only) and model 6 (will all TRCB indicators), controlling for human capital only results in the lowest point estimate on the coefficient on SSA dummy (-0.318). It may be inferred from this finding that improvement in the quality of human capital seems to be the most important aspect ofTRCB for SSA countries.

We also take note that given the broad definition for human capacity used here,it is possiblethat two-way causality obtains (like in the case of institutions).

3.5.4 Role of Infrastructure

Models 5 and 6 show estimation results which control for infrastructure separately and with other TRCB indicators respectively. The infrastructure measure retains its significance when other TRCB variables are controlled for. In both specifications results confirm the importance of the quality of infrastructure in determining bilateral trade flows. In terms of coefficient values, infrastructure is the most important of all the TRCB indicators, with exporters' infrastructure being the most significant with an elasticity of approximately 3.0 (implying an increase of 3% in bilateral trade flows for each 1% improvement in the quality of exporters' infrastructure). The estimated coefficient of the SSA dummy is reduced to -0.37 (approximately 31% less trade flows) when only infrastructure is controlled for, from -0.41 (34% less trade flows) when all TRCB indicators are not included in the estimation. This result suggests that some aspect of SSA's marginalization in the global economy is due to its quality of infrastructure, which is below the world's average quality.

3.5.5 Role of other Variables

Other gravity variables (such as presence of colonial ties, bilateral trade agreement, and common border) in the equation are significant with expected signs. Distance exerts the greatest depressing effect on bilateral trade. The negative impact of distance on bilateral trade is intuitive and has been confirmed by many other studies. It is widely argued that as distance between two trading countries increases transportation and communication costs increase, negatively affecting the magnitude of bilateral trade.

The coefficient on distance is quite robust and unaffected by inclusion of other variables in the gravity equation, confirming the importance of trade costs in determining bilateral trade flows[46].

Our analysis also takes into account regional effects by controlling for various regional trade agreements (*see Appendix 4 for membership of these RTAs*). The objective here is to measure trade patterns within regional groupings which are not captured by gravity variables. Estimation results show that most of them are positive and statistically significant. Also included in the estimation is a dummy variable capturing the existence of any bilateral trade agreement.Our results suggest trade promoting effects ofsuch agreements, as expected. However, quite puzzling is the negative and insignificant impact of EU and NAFTA membership, which seems to suggest that membership in these regional groupings depress trade. However, exploring this a little bit further, results show that in the first two specifications without both tariffs and TRCB variables joint EUmembership raises bilateral trade flows. After controlling for institutions, infrastructure, human capital and tariffs, EU countries in particular will have lower trade than expected. de Groot et.al (2003) found a similar result on jointOECD membership once institutions were controlled for and he concluded that rich countries trade more due to their effective institutions. However, given the multifarious membership of the EU de Groot et. al's finding does not seem to be main factor behind this relationship, hence the absence of tariffs is a plausible explanation.

Despite issues of occasionally insignificant results and sometimes counterintuitive coefficients, overall, the empirical estimates show that TRCB does matter in the determination of bilateral trade flows; and lower human capital has the greatest negative impact on SSA countries (which trade 27% less than countries from other regions)[47]. However, given that qualities of institutions, human capital and infrastructure were calculated as simple averages of the sub-indicators, results must be interpreted with caution.

3.5.6 Comparison with Existing Literature

We compare our results with findings from earlier literature that looked at similar issues. Table 9 highlights some of the major findings. It is important to note that TRCB variables have been measured differently by different authors, with some restricting infrastructure to just port/roads while other papers used an aggregated index for these variables with varying individual indicators. This makes comparison across different studies difficult. However looking at the main gravity variables (GDP for exporter and importer, distance, adjacency and tariffs) the results of this paper are within the range of previous studies. The conventional gravity model suggests that GDP and adjacency boost trade while tariffs and distance depress exports. Even though different data sets were used in the results indicated in Table 9, qualitative

[46] Distance serves as a proxy for the size of transportation costs and also reflects other distances related trade costs.
[47] =(EXP(-0.318)-1)*100

coefficients of the main variables match, though there are slight variations in the magnitudes which might be attributed to biases caused by omitted variables.

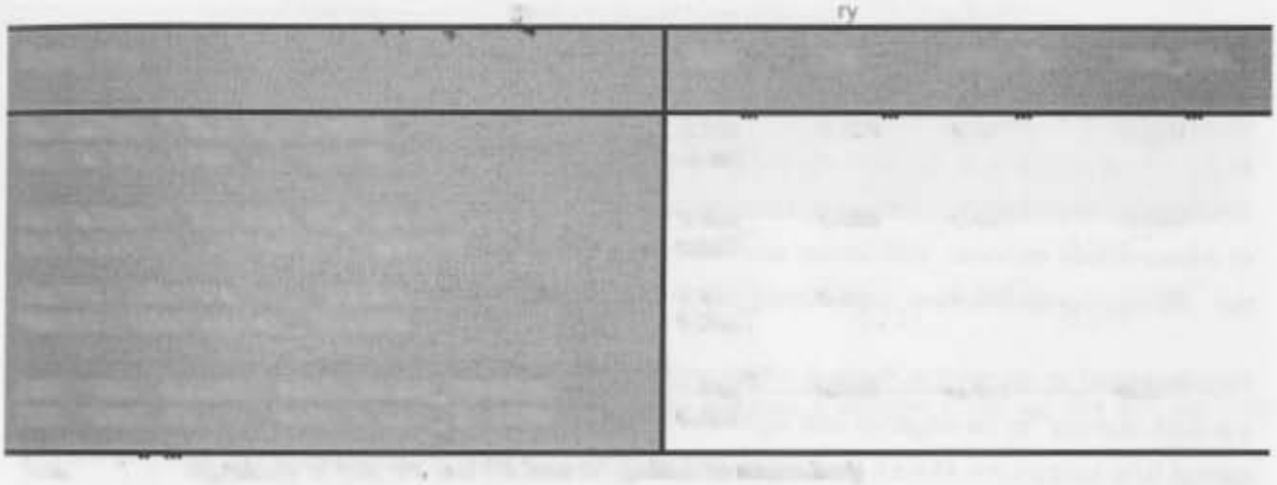
Quite noticeable from earlier literature is the absence of empirical analysis of the impact of human capital on bilateral trade flows. Existing literature either focuses on institutions or infrastructure or the combination of the two. This represents oneof the present thesis's contributions to the ongoing debate on trade-related capacity building. Regardless of the methodology used to measure institutions/infrastructure indicators and varying sizes of the estimated coefficients in existing empirical literature, the direction of impact and significance level demonstrates the importance of infrastructure and institutions in promoting trade flows.

Table 9: Comparison with Existing Research
Dependant Variable: Log Export Value ($US)

Explanatory Variable	Thesis[1]	Thesis[2]	Wilson et.al (2005)[3]	Nordas & Piermartini (2004)[4]	Jansen & Nordas (2004)[5]	Henri L.F. de Groot et. Al (2004)[6]
Log Exporter GDP	0.56***	0.63***	1.24***	1.12***	1.12***	1.15***
	(17.72)	(19.07)			(97.5)	
Log Importer GDP	0.677***	0.646***	0.915***	0.94***	0.96***	0.86***
	(20.43)	(19.11)			(90.9)	
Log Exporter Pop.	0.582***	0.595***				
	(18.46)	(17.56)				
Log Importer Pop.	0.298***	0.351***				
	(9.64)	(10.96)				
Log Exporter Tariff	0.485***	-0.516***	-0.749***		-1.4***	
	(-9.03	(-9.48)			(-3.69)	
Log Importer Tariff	-0.456	-0.527***		-0.74***		
	(-8.06)	(-9.79)				
Log Distance	-1.179***	-1.364***	-1.258***	-1.22***	-1.18***	-1.18***
	(-35.25)	(-34.47)			(42.3)	
Log Border	0.839***	0.866***	0.336***	0.66***	0.81***	0.66***
	(5.73)	(5.84)			(5.31)	
Log Exporter Infrastructure	2.971***	0.275***	0.924***	-0.63***	-0.67***	
	(14.05)	(3.75)			(-9.52)	
Log Importer Infrastructure	2.315***	0.660***	0.307***	-0.46***	-0.35***	
	(10.04)	(9.47)			(-3.78)	
Log Exporter Institutions	-0.492**	0.338	0.620***		0.01	0.43***
	(-2.73)	(1.96)			(0.15)	
Log Importer Institutions	0.142	0.45***	0.281*		0.07	0.31***
	(0.81)	(2.46)			(0.88)	
Log Exporter Human Capital	-0.366***	2.471***				
	(-2.87)	(13.79)				
Log Importer Human Capital	1.448***	0.144				
	(7.52)	(0.79)				
Number of observations	13074	13074	7904	11901	10458	8715

*, ** and *** denote significance at the 10, 5 and 1 percent level, respectively, inside the parenthesis is z value

1. Results for this thesis using composite index for TRCB variables
2. Results for this thesis using ports as proxy for infrastructure
3. Port efficiency and regulatory environment are used as proxies for infrastructure and institutions respectively.
4. Infrastructure variable is a composite index of roads, ports, air and telecommunication
5. Rule of law is used as a proxy of institutions and infrastructure is an aggregated index including quality of roads, ports, airports, railways and telecommunications



region). Our results indicate that although both inter-SSA and intra-SSA coefficients are still negative and significant both before and after controlling for institutions, human resource and infrastructure services their magnitudes dropped significantly. Inter-SSA bilateral trade flows improve by about 21% once institutions, human capital and infrastructure services are controlled for together, while intra-SSA bilateral trade flows improve by approximately 40%. The inter-SSA coefficient drops from -0.412 to -0.326 while the intra-SSA one drops from -0.567 to -0.341. These findingssuggest that once the quality of institutions, infrastructure and human capital are controlled for, bilateral trade within SSA improves drastically as less transactional costs are involved.

We also control for TRCB variables separately in our estimation. This is more illuminating as it highlights how much of the improvement in trade flows is due to institutions, human capital or infrastructure alone. Table 11 below shows the marginal benefits ofseparate TRCBcomponents on inter-SSA and intra-SSA bilateral trade flows.

Table 11: Marginal Benefits ofTRCB on Inter & Intra SSA Bilateral Trade Effects[1]

	Without all TRCB variables	Human Capital Only	Infrastructure Only	Institutions only	With all TRCB variables
Inter SSA	-0.412***	-0.320***	-0.368***	-0.541***	-0.326***
Intra SSA	-0.567***	-0.415*	-0.410**	-0.751***	-0.341**

[1]The results are based on the estimation of the gravity model when SSA trade is separated to inter and intra SSA, and TRCB variables are controlled for both separately and simultaneously.
*, ** and *** denote significance at the 10, 5 and 1 percent level respectively.

Of the three variables human capital enhances inter-SSA trade the most, while the greatest benefit of intra-SSA trade is attained when all three variables are controlled for. This finding supports the argument that lack of trade within SSA countries is attributed to poor quality of human capital, institutions and infrastructure services as often proposed in the literature, whereas trade outside SSA are greatly improved if human capital alone is accounted for. The result is consistent with our earlier discussion, which suggested that on average SSA countries lag behind mainly in the quality of human capital.This variable shows the greatest negative difference,of approximately 40% and 35%,from the non-SSA and sample countries' average standards. Our results support the idea that gaining access to foreign markets requires technical know-how necessary to understand the intricacies of developed countries and to negotiate favourable trading terms.

Finally, to test whether TRCB variables have different trade effects in SSA we extend our analysis by estimating our model using a sub-set of our data, with the estimation restricted to only SSA countries as exporters. This final stage allows us to examine whether different TRCB measures affect trade flows

Table 13: Consistency Analysis using different specifications

Variables						Fixed Effects Models		
	Standard equation 2	Using Residuals 3	OLS-Non-zero sample 4	Tobit-censored at $1 5	Remoteness term 6	Importer Fixed Effects 7	Exporter Fixed Effects 8	TRCB Averages 9
logtrade								
Logtariff_imp	-0.470***	-0.470	-0.455***	-0.158	-0.42***	-0.744***	-0.525***	-0.73***
		(-8.79)	(-8.75)	(-1.56)	(-7.89)	(-5.99)	(-10.69)	(5.63)
Logtariff_exp	-0.505***	-0.504	-0.457***	-0.02	-0.45***	-0.526***	-2.712***	-2.70***
		(-9.34)	(-8.74)	(-0.20)	(-8.35)	(-9.90)	(-13.95)	(-9.15)
Loggdp_imp	0.664***	0.877	0.698***	0.996***	0.69***	0.787***	0.678**	1.39***
		(41.34)	(21.85)	(16.66)	(20.48)	(8.55)	(21.51)	(6.87)
Loggdp_exp	0.581***	1.212	0.60	0.775***	0.60***	0.539***	1.075***	1.47***
		(55.50)	(18.47)	(12.81)	(17.99)	(16.33)	(15.97)	(12.13)
Logpop_imp	0.299***	0.154	0.287	0.299***	0.27***	0.236**	0.310***	-0.36*
		(6.52)	(9.38)	(5.18)	(8.59)	(2.48)	(10.73)	(-1.91)
Logpop_exp	0.573***	0.129	0.581	0.674***	0.55***	0.589***	1.135***	0.69***
		(5.47)	(18.32)	(11.62)	(17.30)	(18.95)	(10.56)	5.35)
logdist	-1.162**	-1.162	-1.187	-1.652***	-1.23***	-1.146***	-1.362***	-1.43***
		(-33.37)	(-36.75)	(-25.90)	(-39.20)	-30.40	(-38.65)	-35.59)
Loginst_imp	0.088	0.090	0.194	2.110***	0.16		-0.032	-10.49***
		(0.52)	(1.17)	(6.54)	(0.93)		(-0.21)	(-6.15)
Loginst_exp	-0.524***	-0.521	-0.404	2.180***	-0.43***	-0.385**		
		(-2.79)	(-2.29)	(6.43)	(-2.28)	(-2.06)		
Loghuman_imp	-0.518***	-0.521**	-0.509	-2.066***	-0.56***		-0.342*	1.10***
		(-2.59)	(-2.61)	(-5.57)	(-2.78)		(-1.84)	(0.77)
Loghuman_exp	1.439***	1.437***	1.513	0.20	1.41***	1.362***		
		(7.35)	(7.97)	(0.55)	(7.27)	(7.06)		
Loginfra_imp	1.956***	1.96***	1.916	2.718***	2.08***		2.012***	4.96***
		(9.63)	(9.67)	(7.12)	(10.26)		(10.77)	(2.46)
Loginfra_exp	2.864***	2.868***	2.907	3.782***	2.99***	2.701***		
		(13.48)	(14.10)	(9.58)	(14.05)	(12.90)		
dcomlang_off	0.845***	0.848***	0.920	1.929***	0.77***	0.721***	0.853***	0.66***
		(11.90)	(13.70)	(14.60)	(10.72)	(9.57)	(12.03)	(8.69)
dssa	-0.323***	-0.325***	-0.33	-1.428***	-0.44***	-0.497***	0.083	-0.12
		(-5.19)	(-5.83)	(13.22)	(-6.80)	(-6.37)	(-1.15)	(-0.68)
dcolony	0.589***	0.588***	0.536	0.057	0.64***	0.474***	0.786***	0.68***
		(3.75)	(3.47)	(0.18)	(4.11)	(2.97)	(5.17)	(4.48)
dborder	0.841***	0.840***	0.777	0.615***	0.79***	0.939***	0.574***	0.58***
		(5.70)	(5.34)	(2.15)	(5.37)	(6.39)	(4.20)	(4.25)
dbilateral	0.219***	0.219***	0.235	0.224	0.22**	0.191**	0.178**	0.11
		(2.47)	(2.69)	(1.26)	(2.54)	(2.09)	(2.09	(1.25)
Lnlat_exp					-0.16***			
					(-6.39)			
Lnlat_imp					-0.16***			
					(-6.42)			
Number of obs.	12621	12621	11405	13570		12621	12621	12621

*, **, and *** significant at 10%, 5% and 1% respectively.

Constant, regional trade agreements, censored observations and exporter and importer fixed effects are not reported in order to save space but full results are available on request.

We estimate 7 different specifications to incorporate these issues and the results are reported in Table 13. Results for the fixed effects model are presented in the last three columns ofTable 13.On comparison, the standard gravity model underestimates the importance of tariffs, GDP and distance, which are estimated to have a larger effect in the fixed effects modelthat uses bilateral TRCB variables. The impact of bilateral trade agreements is also exaggerated; which the standard gravity model estimates to result in 24% more trade compared to 12% in the fixed effects model.

Replacing importers' trade facilitation variables with importers' fixed effects as in Wilson, Mann and Otsuki (2005) yields estimated coefficients ofTRCB variables which are quite similar to our standard gravity equation estimates. The distance estimate and elasticities are also virtually the same.

Next we follow literature that has used latitude to capture remotenessfrom major markets (Nordas and Piermartini, 2004) and estimate our gravity equation including a remoteness term.The results appear in column 6 ofTable 13. The estimated coefficients for tariffs, GDP, TRCB and distance do not differ much from those presented earlier. Despite the quantitative changes in some estimates the qualitative effects do not change in comparison to the standard gravity equation (without both country-fixed effects and remoteness term) as represented in equation 1with results in column 2. Institutions continue to be a problem with the coefficient for importers' institutions being insignificant while the exporters' institutions coefficient takes a wrong sign (and is significant). In terms of coefficient values, quality of infrastructure continues to exert the greatest impact on bilateral trade. The estimated coefficients of latitude show that a 1 percent increase in the latitudewill on average depress export performance by 0.16%. This finding is counter-intuitive. One might naturally expect that as two trading countries become more isolated from all major markets bilateral trade flows between them should increase. However,despite the intuitiveness of using latitude to proxy for a country'sgeographic position relative to all other countries, the existing literature does not provide much discussion of the issue..

Now turning to the issue of zero trade flows, we first use the ordinary least squares estimation which we apply on the set of explanatory variables employed in the original selection model on a sample excluding the zero bilateral trade values. The results, shown in column 4, are not significantly different than those obtained from the previous specification. Just as in the selection model, all the other TRCB variables with the exception of institutions are in line with theoretical predictions. The institutions variables are still not behaving as expected, with both importers' and exporters' institutions coefficients being negative. As before, the variable measuring the quality of exporters' infrastructure is statistically the most significant among the TRCB variables. Like in the selection model, tariffs, country's income (as measured by GDP), country's size (population), presence of colonial ties and common official language, and existence of bilateral trade between two trading partners are significantly important in explaining bilateral trade flows. However, looking at the magnitudes of the coefficients shows that most of the OLS estimates are underestimated compared to sample selection estimates. This is in line with concern noted in the literature that if reduced trade is due to other

factors, omission of zero flows from the analysis will result in an underestimation of the effects of these variables on trade. (Rauch 1999, pp. 18-19 *cited in de Groot et al. 2004).*

To further address the zero bilateral trade flows issue we use a Tobit estimation that imposes censoring on our trade data. All zero trade flows were substituted by 1, thus putting censoring limit to ln(1)=0. It should be noted that there is no relationship between the imposed censoring limit and the zero trade flows other than that $1 is the lowest trade flow recorded in our sample. The results are presented in column 5of Table 13. The results show that the magnitudes of the impact of the TRCB variables is significantly different from the magnitudes in the previously estimated specifications. most TRCB parameter estimates are generally overestimated compared to the Heckman selection model and OLS on non-zero sample. However, as in the previous two specifications, quality of exporters' infrastructure gives the strongest boost to bilateral trade flows. Finding from the Tobit estimation might be showing some biases associated with the estimation technique.As indicated above, a value of $1 is arbitrarily imposed on all zero trade values. However, Silva and Tenreyro (2006) note that there is a dearth of literature that points to potentional bias of elasticities estimated using the log-linear model. They alternatively advocate for use of a pseudo-maximum likelihood (PML) estimation technique, arguing that log-linear models lead to inconsistent estimates.They also argue that log-linear techniques are incompatible with the existence of zeros in trade data, leading to unsatisfactory solutions such as nonlinear transformation of the dependent variable. Comparing their results to others from the literature, they were able to show that estimates using log-linearised models are severely biased.

A final test ofconsistency involved a fourth specification, tested using the Heckman selection model. The gravity equation is estimated using a different construction of the composite indices. In this specification we take into account differences in income levels and country sizes and regress the indices ofTRCB on gross domestic product and population. The residuals from these estimations are then used as representative of deviations from income conditional on expected values for each of the three TRCB indices. Adopting this methodology ensures that we are no longer comparing countries at different levels of development and secondly helps us correct for the likely multicollinearity problem because the proxies ofTRCB are dependent on level of income. The results in column 4 show that the impact of the explanatory variables is robust to the change in the constructions of the composite indices. Although the magnitudes of the coefficients are slightly less, the specification yields similar results to the original model. Again, quality of exporters' infrastructure gives a strongest boost to bilateral trade flows.

3.6 WHAT ARE THE BENEFITS FROM TRADE-RELATED CAPACITY BUILDING: POLICY SIMULATIONS

Making use of estimated results from the standard gravity equation, in this section we analyze different TRCB policy mixes and their likely benefits. We examine the impact through simulation of three main policy approaches: (1) committing resources to the improvement of all the TRCB variables

simultaneously; (2) targeting one particular variable at a time while leaving the others at current levels, and (3) complementary policy initiatives that seek to improve two variables at a time.

3.6.1 Below Average Trade-Related Institutions, Infrastructure and Human Capacity Are Upgraded Halfway to the World Average

The first policy option that we consider is when trade-related infrastructure, institutions and human capital indicators in all SSA countries are simultaneously upgraded so that they come halfway to the world's average level (represented by sample average). While the best and ultimate scenario is to have all SSA countries' trade-related institutions, infrastructure and human capacity at the same level with the world's best, attainment of this high level in the immediate future is limited by resource constraints. Using estimated coefficients on cross-products of human capital, institutions and infrastructure variables our simulations show that bilateral trade flows from the SSA region are increased by US$52.2 billion from the current level, while non-SSA countries' trade is boosted by US$212.8 billion. As noted before, the impact of TRCB initiatives on bilateral trade is not only due to reforms by the exporting country and its trading partners. Results, however, show that own country's reforms are more important resulting in greater benefits than partner country's reforms (for SSA exporters' reforms contribute $48.4 billion while importers' reforms contribute only $3.8 billion).

3.6.2 Targeted TRCB policy

Summary results of simulations targeting one particular variable at a time are presented in Table 6 below.

Table 14: Bringing Below Average Countries Halfway up to the World Average (In US $ Billions)

		Exporters	Importers	Total [exporters+importers]
Human Capital	SSA	28.5(29.6%)	-6.8(-10.4%)	21.7
	Other	109(1.2%)	-36(-0.4%)	73
Infrastructure	SSA	38.0(39.4%)	17.3(26.5%)	55.3
	Other	84.1(0.94%)	58.3(0.65%)	142.4
Institutions	SSA	-4.36(-4.5%)	1.0(1.5%)	-3.39
	Other	-55.8(-0.66%)	25.9(0.28%)	-32.9

To better tailor the simulation exercise to inform policy decisions on what kind ofTRCB initiative might yield the greatest improvements in trade in addition to improving all TRCBhalfway to the world's average we examine the impact of improving one TRCB indicator at a time halfway to the world average (while holding other indicators constant, at their current levels) and compare the trade gains (as proxiesfor opportunity costs). Thus under this simulation we are assuming that all available TRCB resources are targetedat one particular initiative at a time. The parameter estimates of our TRCB variables in the standard gravity model allows us to do this directly as they measure the percentage change of trade due to a particular TRCB variable change given that others are held constant. Estimating the impact of both domestic and trading partners' (exporters and importers' respectively) capacity development efforts highlights that TRCB trade benefits are a combined effect of own and partners' export and import reforms. Our findings reveal that in the SSA region, improvement in

human capital while leaving infrastructure and institutions at their current levels can result in US$21.7 billion (total of exporters' and importers benefits) increase in bilateral trade flows which is equivalent to approximately 13.4 per cent increase in total bilateral trade flows with the region. Improvement in human capital will enable importing SSA countries to reduce their imports by US$6.8 billion, as the countries will be better placed to produce manufactured exports on their own[52]. A TRCB policy that targets only infrastructural development in the SSA region will result in the highest bilateral trade boost, of approximately US$55.3 billion, with exporters and importers contributing US$38 billion and US$17.3 billion respectively. This is slightly double the benefit from human capital.

According to our findings, focusing all attention on the improvement of institutions alone will not result in increased trade flows, either in the region or in other non-SSA countries. Moving resources from either improving human capital or infrastructure towards institutional development will be the worst TRCB policy to adopt. However, results on complimentary effects ofTRCB initiatives on trade reveal positive gains in bilateral trade flows when institutions are improved in conjunction with the other factors. The next section discusses these issues in detail.

3.6.3 Complimentary TRCB policy option

Lastly we look at the policy options that emphasize the complementarities ofTRCB initiatives. Under this simulation we are assuming that all the available TRCB resources are targeted to improving two or all of the TRCB indicators at a time, upgrading them halfway to the world's average level. The following combinations are considered: human capital and institutions, human capital and infrastructure, and institutions and infrastructure. To compute the potential benefits we make use of the estimated results of the standard gravity equation extended by interaction variables ofTRCB (cross-products of the variables). Summary results are shown in Table 14 below.

Table 15: Bilateral Trade Benefits from Complementary TRCB Policies in US$ Billions

		Exporters	Importers	Total
Human Capital &Institutions	SSA	39.5	11.3	50.8
	Other	214	112	326
Infrastructure & Institutions	SSA	32.8	14.8	47.6
	Other	178	156	334
Human Capital & Infrastructure	SSA	63	15.6	78.6
	Other	160	81.9	241.9
Institutions, Human& Infrastructure	SSA	48.4	3.8	52.2
	Other	194	18.8	212.8

[52] Our estimation using manufactured exports supports this speculation, and shows that a 1% improvement in the quality of human capital results in a greater and more significant decrease in the imports of manufactured goods, than when we estimate using total exports or primary exports.

Complementing human capital and infrastructural development result in the highest increase in SSA's exports and imports (US$ 78.6 billion), while for non-SSA countries it is upgrading of human capital and institutions, and institutions and infrastructure that matters most for exporters and importers respectively.

3.7 CONCLUSIONS

The motivation for this research was the notion that development resources flowing to Africa are scarce, and therefore their allocation should be prioritized. This paper sheds light on the optimal balance of emphasis in TRCB policies as amongst infrastructural, institutional and human capital development. Using the opportunity costs the paper interrogates the current focus ofTRCB activities.

This study's findings help us to conclude that trade-related capacity building matters in determining trade flows. However, compared to the rest of the world trade-related capacity building has a potentially large impact on trade flows in SSA. If all TRCB resources are committed towards one particular area at a time, SSA would benefit the most by improving its infrastructure followed by human capital development, contrary to emphasis given to institutions in theoretical development literature. Results show that if SSA improves its human capital halfway up to the world average its imports will decrease by approximately US$ 6.8 billion.

However, our findings show us that interactions ofTRCB policy mixes make a difference. To get the greatest boost of SSA's bilateral trade flows a complementary policy mix that targets improvement of human capital and infrastructure should be adopted. Our findings also reveal the existence of different TRCB needs between regions, with non-SSA countries gaining the most from complementing infrastructure and institutions. Infrastructure was noted to be persistently important to both SSA and non-SSA countries, implying the importance of having a minimum level of infrastructure for trade flow to occur. Emphasizing human capital development alone (which is the main focus of existing TRCB initiatives) at the expense of improvement in infrastructure in SSA will not bring about the greatest benefit.

Our finding on institutions was not robust to changes in specifications leading us to conclude that, even though institutions matter they are usually country specific or even region specific in their effect on how the economy works. In particular, an institutional policy reform may have one consequence in one country and another effect (or no effect) in another. This implies that besides knowledge in economics policy makers should also have very good sense of a country's specific social infrastructure (institutions). Country specific studies would be more informative on which kind of institutions matter most. The process of coming up with a composite index on institutions (adopted in this paper), whichhas common policy applicability to all countries, might result in loss of some relevant information. However, institutional homogeneity was shown to boost trade flows, in line with other findings.

An overall implication of our findings is that a one-size-fits-all approach to TRCBis inefficient as there are different TRCB needs between regions. Therefore any attempt to evaluate the impact ofTRCB has to take into account interrelationships among conditions and trade capacities. This then raises questions about the adequacy of existing standard theoretical growth and trade models to adequately accommodate complexities arising from such interrelationships. In the next chapter this argument is explored using both growth and trade models.

CHAPTER 4

IMPLICATION OF TRADE-RELATED CAPACITY BUILDING ON OVERALL DEVELOPMENT

4.1 INTRODUCTION

Although attempts have been made to evaluate trade capacity building programmes with respect to policy formulation and implementation, little has been done to assess the effectiveness ofTRCB policy options in promoting growth, or to evaluate an optimal balance between trade-related and general investment from this perspective. There is a dearth of research articles that employ rigorous quantitative methods to analyze information and/or support arguments related to TRCB. In view of this limitation in existing studies, there is need for quantitative studies that specifically investigate the opportunity costs of different TRCB programmes on overall development as measured by growth. However, using the existing trade-growth models we cannot address some fundamental questions that may arise from assessment of a trade promotion policy as a development lever. For instance, existing models do not adequately account for complementarity between infrastructure, human capital and institutions, which are particularly relevant for the TRCB initiatives.

We therefore, argue in this chapter that theoretical propositions about trade-growth linkages are inadequate to address the dynamics in TRCB policy. Evaluating the growth impact of trade generally or TRCB in particular therefore requires some degree of modification of existing standard trade-growth models. For example, there are wide varieties ofTRCB activities on offer to least developed countries. Furthermore, empirical findings in Chapter 3 indicate the importance of interactions of these TRCB policy mixes. For instance, in the SSA region complementing infrastructure and human capital will bring the greatest bilateral trade boost. Therefore,using standard trade-growth models will limit our ability to engage in deep policy analysis and evaluate how these different TRCB policy mixes affect trade and/or growth.

This chapter will extend existing models of trade and growth toaccount for the impact ofTRCB. These models are then used to explore the implications ofthe empirical findings in Chapter 3 on traditional trade-growth links. A standard endogenous growth model, augmented by public investment as proposed by Barro (1990) and Grossman and Helpman (1991) model will be used in the analysis.

Although this chapter borrows heavily from growth and trade literature, it is beyond the scope of the chapter to present an exhaustive discussion of the growth-trade relationship.This is an issue which has been subject to intensive research and consensus seems to have emerged that, indeed, growth is positively associated with trade. In particular, the argument that rapid growth in Asian developing economies is due to outward-oriented policies has gained broad acceptance.

The remainder of the chapter is organised as follows. Section 4.2 briefly presents the standard theoretical argument for the trade-growth link. While traditional trade theory proposes that trade

positively impacts economic development, the empirical literature has not yielded conclusive findings (Davis and Weinstein 2002). Sub-section 4.2.1 highlights various channels through which trade affects growth. One source is technological spillovers and knowledge transfers from trade. There is empirical evidence to show a positive impact of international trade on technical progress through increased foreign competition. Sub-section 4.2.2 reviews an extension of the endogenous growth model to take account of public investment. The analysis here borrows heavily from Barro (1990), who incorporates a public sector into a simple, constant-returns model of growth and derives a balanced growth path. After making the assumption that trade-related investment is a form of public investment, we recommend adoption of a CES-translog function as proposed by Dewan and Min (1996) and extend Barro's framework to highlight the likely impact ofTRCB on growth. Section 4.3 concludes the thesis.

4.2 THEORETICAL FRAMEWORK

4.2.1 Trade-Growth Link Theoretical Arguments

The proposition that trade is an important driver of economic growth is not new in economic literature. Smithian, Ricardian and Hecksher-Ohlin models form the main roots of the theoretical literature on trade and growth. These traditional theories share the conclusion that international trade leads to higher welfare than autarky. Openness to trade contributes to the following sources of growth: growth in inputs of production, improvement in the efficiency of allocation of inputs across activities, innovation that creates new products and new uses for existing products, and increases in the productivity of inputs (Jayne 2001). According to Helble, Mann and Wislon (2009:1) an expansion in trade, investment and production opportunities leads to income growth which will in turn enhance development.

These traditional theories, along with the development of other new trade theories, are discussed briefly in Chapter 2, section 2.2. What is evident from this discussion is that the explanatory power of traditional trade theories is fairly limited, thus leading to a search for new insights and approaches. Traditional theories focus on static allocative gains from trade and overlook dynamic gains. For example, standard trade models are based on zero transport costs. They make the assumption that the capacity exists to structurally change the economy and engage in international trade. Even those models including tariff policies make these assumptions. Assumptions of traditional theories have frequently proven empirically inadequate, as the removal of policy barriers to trade does not necessarily increase trade flows unless other capacity constraints are removed.

To further understand the theoretical support for any influence of trade on growth we must turn to the more recent endogenous growth models, which argue that the growth process is part and parcel of an economic system, and hence not an exogenously determined process as in older theories (Strydom 2005). In the context of trade and growth, these models emphasise that trade works as a conduit of knowledge spillovers, which in turn enable an economy to achieve increasing returns. Jayme

(2001:8) notes that, these '...models have found in Total Factor Productivity (TFP) and the accumulation of knowledge channels to relate trade and growth'. These recent developments in growth theory have considered various sources of long-run growth, each of which involves a positive externality associated with some activity. Examples include human capital accumulation through either learning by doing or education and technological advance through R&D activities. Trade affects growth through its effect on the level of these activities. Theory identifies at least three main channels through which trade yields gains for growth: exploitation of comparative advantage; flow of ideas, knowledge and technologies; and discoveryof new ways of doing things.

4.2.2 Trade-Growth Empirical literature

The trade-growth nexus has been explored in many empirical studies such as Balassa (1985), Ben-David (1993), Rodriguez and Rodrik (2000), Frankel and Romer (1999), Dollar and Kraay (2002) and Warner (2003), among others. However, the hypothesis of the trade-growth link has not gone without debate as questions of causality remain unresolved. Because of the possible existence of a two-way link between trade and growth it has been difficult to gain conclusive evidence on the nature of this link, resulting in conflicting views. Although rapid globalization is often seen as indicative of the importance of international trade to growth (Hassam 2005), findings on the impact of international trade on growth have not been very persuasive as a moderate positive relationship has been found.

One of the most influential papers on the trade and growth debate is Dollar (1992), which tested the relationship between growth and measures of outward orientation. Dollar ran a regression of growth in per capita income in 95 countries averaged over the period 1976-85 on trade distortion and exchange rate volatility measures as well as on the rate of investment in these countries over the same period. He concludes that outward orientation has a statistically significant impact on growth, with the most open countries having a per capita growth rate of 2.9% while the most closed ones had an average growth rate of -1.3%. The author also estimates that if Africa and Latin America were to shift to Asian levels of outward orientation, then their per capita growth rates would increase by 2.1 and 1.5 percentages points respectively.

Neuhaus (2005) argues that more trade boosts growth as economies gain from international exchange of ideas. He further concludes that stiffer competition that comes with international trade results in ever improving production processes and products. The paper highlights multifarious channels through which openness feeds through to growth, the main ones being technology transfer and improvement in institutional frameworks.

Frankel and Romer (1999:391) claim that specialization according to comparative advantage, exploitation of increasing returns from larger markets, exchange of ideas through communication and travel, and spread of technology through investment and exposure to new goods are some of the channels through which trade positively affects income. Controlling for endogeneity of trade with geographical variables, the authors found a large and robust positive effect. This result was found to

be consistent across different samples and specifications, hence bolstering the case for the importance of trade and trade-promoting policies.

Alcala and Ciccone (2004) argue that trade works through labour efficiency to positively affect productivity. The main argument of their paper is that use of the wrong measure of trade in existing empirical literature results in the underestimation of the productivity gains from openness. Most of the literature measures trade by nominal imports plus exports relative to nominal GDP (Alcala and Ciccone 2004:613). In contrast, Alcala and Ciccone measure trade by constructing and estimating variables for real openness and tradable GDP openness, defined as 'imports plus exports in exchange rate US$ relative to GDP in purchasing-power-parity US$ (PPP GDP), and nominal imports plus exports divided by the nominal value of production in the tradable goods sector' respectively. They found the impact of international trade on labour productivity and income per capita at the country level to be highly significant and very robust.

Baldwin's (2003) survey of empirical literature notes disagreement among economists on the openness–growth debate due to differences in the definition and measurement of these ideas. Also contributing to the disagreement is the problem of causation, which has been found to be ambiguous; the positive relationship between openness and growth holds only under certain conditions (Grossman and Helpman 1990 & 1991; Rodrik 1999).

Rodriguez and Rodrik (2000) criticise the consensus that trade reforms led to faster growth by identifying methodological faults in the five most representative empirical studies of the impact of trade openness on growth (Dollar, 1992; Ben-David, 1993; Sachs and Warner, 1995; Edwards, 1998; and Frankel and Romer, 1999). In particular,Rodriguez and Rodrik heavily criticiseSachs and Warner's trade openness index, arguing that the components which most significantly determine its positive relation with growth (socialist system, exchange rate distortion, and exports marketing boards), may be capturing the impact of other non trade-related policies. For instance, the authors argue that that the socialist system component is clearly associated with many other policies not related to trade. Furthermore, the index relies on subjective weighting of highly imperfect measures of trade restrictiveness.Since Rodriguez and Rodrik'scritique, empirical attempts to capture the effect of trade liberalization on economic growth have faced the challenge of finding a proxy for trade policy openness that is robust against it.For instance, Dollar and Kraay (2002) concur with Rodrigiez and Rodrik that measures used for trade openness in the empirical literature are imperfect, and employ decade-over-decade changes in the volume of trade as an imperfect proxy for changes in trade policy.

Despite, the debate around measurement of openness, the argument that trade drives economic growth has motivated many developing countries since the 1980s to undertake trade reforms, reducing both tariff and non-tariff trade barriers, in order to increase international trade. Recently the focus has additionally been on trade-related capacity building with the broad objective of integrating developing countries into the multilateral trading system. In the previous chapter we empirically

evaluated the effects of the intended outcomes ofTRCB policies on bilateral trade flows. In this chapter we go a step further and evaluate trade-growth models, arguing that the standard models are inadequate to accommodate complexities associated with interrelationships among conditions for growth which require complementary trade policy. We then make suggestions as to how these models could be modified and/or extended to allow for an analysis of the impacts of different TRCB policy options on overall development.

4.2.3 Trade-Growth Theoretical Model

Technological innovation is one of the standard recognized channels through which trade affect growth. The empirical literature has recently relied on the endogenous growth model to investigate this link between trade and growth, with studies including trade factors in otherwise typical production functions. A key feature of these endogenous growth models is that they are capable of generating ongoing growth in the absence of population growth, implying that long-run national growth rates are in general sensitive to national characteristics such as tastes, technology and tax structure. This feature of the model makes it possible to analyze the impact of trade policies on long-run equilibrium growth rates.

Trying to find a model that adequately analyses the impact ofTRCB initiatives is not straightforward, given that these issues are not trade or growth issues per se but span across two strands of literature. An emphasis of the thesis is how TRCB influences growth, both through trade and directly. In what follows, we explore these two routes using Barro's (1990) model, which emphasises the directrelationship between growth and the variables stimulated by TRCB;and Grossman & Helpman's (1991)'s model ofthe relationship between growth and trade. The approach adopted has been to look at independent growth and trade theoretical models with the aim of integrating them in such a way that they can be used to generalize the empirical findings discussed in the previous chapter. The paragraphs below present Grossman-Helpman and Barro models followed by a discussion of their implications in the subsequent section.

Grossman - Helpman (1991) Model

Grossman and Helpman (1991) provide an analysis linking long-run growth to trade policies. In an earlier (1990) study, Grossman and Helpman argue that most prior research on trade and growth set in a neoclassical framework neglected the effects of trade structures on growth rates. Additionally, the paper argues that traditional trade-growth literature identifies level effects but no rate effects. The authors then develop a theoretical framework which introduces technological innovation, and argue that trade affects long-run growth rate through its impact on the stock of knowledge (ibid 1991). They model an endogenous rate of long-run growth that relates trade and growth through diffusion of technology and knowledge. They argue that a full understanding of growth has to consider the accumulation of knowledge and scale economies.

Technological progress is modelled as endogenous, resulting from profit maximising behaviour of entrepreneurs investing in research and development and as exhibiting constant return to scale. The

productivity of the local employees engaging in R&D depends on the stock of knowledge capital in the country, which in turn is influenced by contacts between local agents and international business communities. An increase in bilateral trade is assumed to increase commercial exchange, thereby increasing stock of knowledge capital. The intuition is that the more interactions between domestic and foreign agents the more access is gained to accumulated knowledge and new discoveries taking place in the international markets. This contact with the international markets facilitates spillover benefits for the domestic economy. Hence, in the Grossman and Helpman model this diffusion of technology and knowledge relates endogenous rate of long-run growth and trade.

The model has the following underlying assumptions; a small economy with labour as a single factor; two products Y and Z are consumed but only Y is produced in the economy by perfectly competitive firms using labour and a continuum of differentiated intermediate products. Total factor productivity increases with the number of available differentiated inputs. The underlying hypothesis informing this assumption is that exchange of intangible ideas is facilitated by international trade in tangible commodities. This implies that trade policy that seeks to promote bilateral trade, e.g. trade-related capacity development initiatives, will increase commercial exchange, thereby increasing the stock of knowledge capital, accelerating technical progress, and raising grow of the economy. This link gives a direct channel through which trade feeds through to growth.

In the traditional trade-growth literature it was assumed that international spillovers are automatic and instantaneous, in symmetry with the treatment of local spillovers, thus neglecting the process through which these spillovers take place. The production process makes use of labour and intermediate inputs, with each unit of intermediate input requiring one unit of labour, implying that its marginal cost equals the wage rate $(MC = w)$. Furthermore, the model assumes constant elasticity of substitution between varieties such that $px = \frac{w}{\alpha}$. The underlying production function for good Y is as follows:

Equation 20

$$Y = A_Y L_Y^{1-\beta} X^{\beta} n^{\beta(1-\alpha)/\alpha}$$

where L_Y denotes the employment of the final-goods sector, and X is the total quantity of intermediates used. Assuming a constant intersectoral allocation of labour, Y is envisaged to grow at the rate $g\beta(1-\alpha)/\alpha$, where $g \equiv \dot{n}/n$ is the rate at which new varieties of intermediates are introduced into the economy. The authors show that an increase in the number of varieties of middle products raises total factor productivity (TFP). Variety growth stems from the stock of knowledge capital K, which accumulates in two ways –firstly through new discoveries by researchers, and secondly through commercial interaction between domestic and foreign agents. It is assumed that the volume of bilateral trade increases the extent of spillovers between the two countries such that $K(t) = F[n(t), T(t)]$; where $T(t)$ is the cumulative volume of trade at time t and $n(t)$ is the

number of varieties available at *t*. Assuming constant returns to scale the production function of knowledge takes the following expression:

Equation 21

$$K = n\phi(T/n), \qquad \phi > 0$$

Where (t) is the spillover function. It is assumed that there is freedom of entry in R&D such that the marginal product and marginal cost of research are equal and in addition the authors impose a 'no-arbitrage' condition which implies the following relationship:

Equation 22

$(1-\alpha)X\phi/\alpha a + \dot{W}/W - \dot{K}/K = r$; where r is the instantaneous rate of interest on consumption loans.

The model also assumes the existence of a household whose members seek to maximize intertemporal utility such that future consumption is discounted at rate ρ. At the steady state and assuming a balanced budget, the rate of change of expenditure $(r-\rho)$, which is assumed to be equal to the growth rate of output $(g\beta(1-\alpha))/\alpha$, wages will also grow at the same rate. Grossman and Helpman (1991:521) argue that when ϕ approaches a constant, the rate of growth of knowledge capital converges on g. Therefore, the steady state (Equation 22) reduces to:

Equation 23

$$(1-\alpha)X\phi/\alpha a = g + \rho$$

The growth equation boils down to:

$$g = (1-\alpha)X\phi/\alpha a - \rho$$

Assuming that in the steady state consumption growth is equal to output growth, trade volume is assumed to grow at the same rate, such that $\dot{T}/T = \frac{g\beta(1-\alpha)}{\alpha}$. Hence, the size of α relative to $\beta(1-\alpha)$ will determine whether T/n will shrink, grow without bound, or converge to a constant in the long run. Considering the first possibility, $\alpha > \beta(1-\alpha)$ implies declining importance of international trade spillovers as a source of domestic knowledge capital, offering a negligible contribution to K compared to contribution by local research. The second possibility considered is when $\alpha < \beta(1-\alpha)$. This occurs when the ratio of trade volume to the number of varieties tends to infinity, $T/n \to \infty$; the implication of this is that international trade spillovers will continue to drive

growth in the long run. The last possibility is when $\alpha = \beta(1-\alpha)$. In this case both the volume of trade and number of varieties grow at the same rate g. The model highlights two main ways in which g would change: first through an exogenous change in ϕ, and secondly through change in the tariff rate. These conditions highlighted in the Grossman - Helpman model are important in particular to the SSA region in which most countries are not yet the steady state. Even in the case where trade is assumed not to play a part in long-run growth, it will still be welfare enhancing, as policies that expand the level of trade increase the convergence to steady state. As such, TRCB will play an important role in this model, given its impact on trade.

The Barro Model

In this section, I briefly highlight the Barro (1990) model, which explained long-run economic growth by incorporating productive government expenditure, in a simple endogenous growth model. Barro (1990:S103) notes that "recent models of economic growth could generate long-run growth without relying on exogenous changes in technology or population". One such model is the Ramsey-Cass-Koopmans model that extends the Solow growth model by including optimising households and firms. Because of its simplicity this model provides a benchmark for endogenous growth models. The model assumes competitive firms that rent capital and hire labour to produce and sell output, a constant population and an infinitely lived representative household that supplies labour, holds capital, consumes and saves. According to Romer (2001), this model, which was developed by Ramsey (1928), Cass (1965) and Koopmans (1965), avoids all market imperfections and all issues raised by heterogeneous households and intergenerational linkages. Evolution of capital in this model is derived from the interaction of optimising households and firms operating in a competitive environment. Barro (1990) extended these growth models to include public services and policies that affect production and utility. In his analysis, he incorporates a public sector into a simple, constant-returns model of economic growth.

We follow this approach, and make an assumption that TRCB initiatives are purely provided from public resources. Assume that each household-producer has access to the following two-factor Cobb-Douglas production function:

Equation 24

$$Y = F(K, AL)$$

Now incorporating a public sector, the augmented production can be specified as:

Equation 25

$$Y = F(K, AL, K_g) = (K_g)^{\alpha}(AL)^{\beta}K^{1-\alpha-\beta}, \alpha, \beta \in (0,1)$$

where Y denotes output, $A > 0$ the level of technology, K_g is the quantity of public services, K is an inclusive measure of private capital, and AL is effective labour. Barro assumes that the production function exhibits constant returns to scale in all factors of production. The general idea of including K_g as a separate argument of the production function is that private inputs, as represented by K and L are not a close substitute for public inputs. Normally production factors are gross complements. A higher stock of public capital in infrastructure, for instance, would tend to raise the productivity of other inputs, such as labour and the stock of private capital, thereby reducing unit production costs (Agenor and Moreno-Dodson 2006; Blejer and Khan 1984b).

From Equation 25 we derivethe marginal products of K and AL to be , respectively,

Equation 26

$\delta y / \delta k = (1-\alpha-\beta)(K_{g'} / K)^{\alpha}(L/K)^{\beta} > 0$; and $\delta Y / \delta AL = \beta(K_g / K)^{\alpha}(K/AL)^{1-\beta} > 0$.

This result shows that a higher stock of public capital (relative to private capital) increases the marginal product of both inputs – although it does so at a decreasing rate, given that $\alpha < 1$ (Agenor and Moreno-Dodson 2006). This is a direct productivity effect of public capital that is commonly proposed to account for a growth effect of public capital. Agenor and Moreno-Dodson (2006) note that this positive effect of public capital on marginal productivity holds even for other components of public spending related to property rights and maintenance of public order, despite the fact that they may not be considered as being directly productive.

Normalising the population size to unity, the production function becomes

Equation 27

$Y = (K_g)^{\alpha}(A)^{\beta}K^{1-\alpha-\beta}, \alpha, \beta \in (0,1)$

such that $\delta y / \delta k = (1-\alpha-\beta)(K_{g'} / K)^{\alpha}(A/K)^{\beta} > 0$

Assuming that a representative infinitely-lived household seeks to optimise the following utility function:

Equation 28

$U = \int_0^{\infty} u(c)e^{\rho' dt}$

where c is consumption per worker, and ρ is the subjective discount rate, the greater the value of ρ, the less the household values future consumption relative to current consumption. Population, which corresponds to the number of workers and consumers, is constant. The individual worker's utility functionused is of the following form:

Equation 29

$$u(c) = \frac{c^{1-\sigma} - 1}{1-\sigma},$$

where $-\sigma$ is the constant elasticity of marginal utility with respect to consumption ($\sigma > 0$). Empirically it has been shown that the relevant case for developing countries is $\sigma < 1$ (Agenor 2006). We assume that the government maintains a balanced budget, and that government expenditure is financed contemporaneously by a flat-rate income tax plus some resources from outside, such that,

Equation 30

$$K_g = T = \tau y + F = \tau A K_g^{\alpha} L^{\beta} K^{1-\alpha-\phi} + F$$

where T is the government's total revenue, $\tau \in (0,1)$ is the tax rate, and F are resources made available to government for development activities which are exogenous and non-distortional and cannot be used for current government consumption but only for development activities. We further assume that even if F is zero the government should be able to provide these activities; this is in line with the sustainability policy emphasised under donor funded programmes. Under that assumption, F can be equated to zero, and we can still evaluate consequences of a trade-related capacity building programme, by assuming that it has been financed from internal government resources.

The objective of the representative household is to maximise lifetime utility subject to the budget constraint, such that the household's optimisation problem is:

Equation 31

Maximise $$U = \int_0^{\infty} \frac{c^{1-\sigma} - 1}{1-\sigma} e^{-\rho t} dt$$

Subject to: $$Y = \pi^{\beta} K_g^{\alpha+\mu\beta} K^{1-\alpha-\beta}$$

$$K_g = \tau Y$$

$$\dot{K} = (1-\tau)Y - C,$$

where for simplicity we assume zero depreciation.

Setting up the Langragian and solving it shows that the rate of growth of consumption at each point in time is given by;

Equation 32

$$\frac{\dot{c}}{c} = \frac{1}{\sigma}(f' - \rho)$$

where f' is the marginal product of private capital. With the presence of a flat-rate income tax the return to private capital is $(1-\tau)\delta Y / \delta K$. Combining equation (6) and equation (32) we rewrite equation (11) as:

Equation 12a

$$\frac{\dot{c}}{c} = \frac{1}{\sigma}\left[(1-\tau)(1-\alpha-\beta)\left(\frac{K_g}{K}\right)^{\alpha}\left(\frac{A}{K}\right)^{\beta} - \rho\right]$$

In this model we assume that the economy is always at a position of steady state growth whereby all variables, consumption and stocks of private and public capital and output grow at the same constant rate γ. Then we can rewrite equation (6a) as follows;

Equation 12b

$$\gamma = \frac{1}{\sigma}\left[(1-\tau)(1-\alpha-\beta)\left(\frac{K_g}{K}\right)^{\alpha}\left(\frac{A}{K}\right)^{\beta} - \rho\right]$$

From the above equation we can see that an increase in τ reduces the growth rate, γ.

Equation 33

$$\begin{aligned}
\delta\gamma / \delta K_g &= \frac{1}{\sigma}\left[(1-\alpha-\beta)(1-\tau)(\alpha)K_g^{\alpha-1}A^{\beta}K^{1-\alpha-\beta}\right] \\
&= \frac{1}{\sigma}\left[(1-\alpha-\beta)(1-\tau)\left[\frac{A^{\beta}(\alpha+\beta)K_g^{\alpha-1}K^{1-\alpha-\beta}}{K}K\right]\right] \\
&= \frac{1}{\sigma}\left[(1-\alpha-\beta)(1-\tau)\left(A^{\beta}\delta Y / \delta K_g \frac{1}{K}\right)\right]
\end{aligned}$$

Set $(1-\alpha-\beta)$ equal to π then

Equation 33a

$$\delta Y / K_g = \left(\frac{\pi}{K}\right)(1-\tau)(\delta Y / K_g)$$

$$= \frac{\pi}{K}(\delta Y/K_g) - \frac{\tau}{K}(\delta Y/K_g)\tau$$

$$= \frac{\pi}{K}(\delta Y/K_g) - \frac{\pi}{K}(\delta Y/K_g)\frac{K_g}{Y}$$

$$= \frac{\pi}{K}\left[\delta Y/K_g - \delta Y/K_g \frac{K_g}{Y}\right]$$

$$= \frac{\pi}{K}\left[\delta Y/K_g - \eta_{K_g}\right] > 0$$

Iff $\delta Y / \delta K_g > \eta_{Kg}$, where η_{K_T} is elasticity of output with respect to public expenditure.

The implication of the above result is that $K_g < Y$ i.e. $\frac{K_g}{Y} \in (0,1)$ for public investment to have a growth effect on output. Large public expenditure will generate desirable positive impact on output if the level of income is sufficiently high relative to public service outlays. Large investments in public services may therefore require concomitant measures to improve economic performance. An implication of this finding is that increase in public expenditure alone will increase output up to a certain point, but thereafter the increase will be marginal or zero.

4.2.4 Implications of Empirical Findings on the Trade Growth Model

The main contribution here is how complementarity ofTRCBvariables enhances the growth impact - a focus not addressed in the Grossman and Helpman model. The two models reviewed above make it possible to extend our analysis to introduce TRCB initiatives. First, Grossman and Helpman's model links trade and growth through diffusion of technology and knowledge. In the model, accumulation of knowledge is a function of trade volume and the number of varieties such that $K = n\phi(T/n)$, where T is the cumulative volume of trade as noted above. The basic argument advanced by Grossman and Helpman is that creation of new varieties, which is essential for economic growth, is an interactive learning process that involves interaction ofboth domestic and foreign actors. According to the model the commercial interactions, which are enhanced by volumes of bilateral trade, increase the knowledge capital base and result in increased economic growth. It is this link between the knowledge capital base and the volume of bilateral trade established in the Grossman and Helpman model that allows us to extend our analysis to introduce TRCB. Given the important role played by trade in the model it is not farfetched to expect a focus or discussion within the model on how to enhance it.The model, however, makes an implicit assumption that capacity exists in the firm/economy to optimally engage in international trade – an assumption underlying standard trade models. This is in sharp contrast with some literature that has registered discontent with these traditional trade theories (Leontief 1947, Linder 1961, Bardhan 1992, Trefler 1993 and 1995, CEPR 1994, Leamer 1984). Review of literature show that removal of trade barriers does not necessarily increase flows unless other capacity constraints are removed. For instance, poor quality of infrastructure and institutional divergence have been noted to directly and indirectly increase trade costs, resulting in reduced intra and inter regional trade. Therefore, removal of tariffs (as in the Grossman - Helpman model) will not enhance growth if trade is constraints by infrastructure, poor institutions or human capital. The importance of these other factors in enhancing trade provides a direct link between TRCB initiatives and long-run growth in Grossman - Helpman framework - allowing us to relate TRCB and output directly; any policy initiative that affects volume of trade flows will have a direct impact on the knowledge capital base (K) and enhance economic growth.

From our empirical analysis we find that TRCB increases bilateral trade flows among trading partners; in particular TRCB policy complementarity gives the highest boost to bilateral trade flows. According to the Grossman and Helpman model,increased trade will enhance knowledge capital accumulation. Therefore, taking into account findings in the previous chapterin which we established a strong relationship between bilateral trade flows (T) and trade-related capacity building in institutions, human capital and infrastructure,we can modify the Grossman and Helpman model. The function $K = n\phi(T/n)$can be re-specified to be a function ofTRCB initiatives; taking into account the empirically established relationship between TRCB and trade $T_{(t)} = \omega(I, H, F, \varphi)$ where I, H, F and

ψ are institutions, human capital, infrastructure and other variables as defined in the preceding chapter.

Now turning to the Barro (1990) model, from the earlier discussion the normalised augmented Barro production function is as follows:

$Y = (K_g)^{\alpha}(A)^{\beta}K^{1-\alpha-\beta}, \alpha, \beta \in (0,1)$.

where, Y denotes output, $A > 0$ the level of technology, $K_g$is the quantity of public services, and K is an inclusive measure of private capital.Unlike the Grossman and Helpman model, Barro's does not explicitly include channels relating TRCB variables, trade and growth. There is need therefore, to develop a theoretical argument that can account for TRCB in the endogenous growth model.

TRCB can enter the model in two ways. The first way is through its impact on trade and then level of technology (A). It has been widely argued that openness to international trade is one channel through which new technologies (knowledge) flow from abroad (Fagerberg et al. 2009; Ben-David 2002; Coe, Helpman and Hoffmaister 1997). Grossman and Helpman (1991:520) also make the argument that interaction with the outside world gives access to knowledge (new wisdom and discoveries). According to this perspective, new technologies that emerge in developed economies could gradually diffuse to the developing world and close the development gap between rich and poor economies (Fagerberg et al. 2009).

To represent a second channel, TRCB could be modelled directly into the Barro model by assuming that investment in TRCB(K_t) has strong public good properties. Endogenous growth modelsincorporate other factors into the production function by assuming the existence ofeither spillovers or increasing returns, as when accumulation of an intended input has an unintended positive effect on productivity, e.g. through the learning by doing mechanism noted by Arrow (1962). This assumptionof spillovers and increasing returns seems plausible in application toTRCB policy target variables; given the public good nature of many of these investments (especially those in education and institutions). As noted before, TRCBis typically concentrated on human capital, and/or institutional and infrastructural capacity development. Improvement of trade-related infrastructure, institutions, and/or human capital will not only benefit the targeted sector but other sectors of the economy in general. Consider, for example, a TRCB policy option that promotes investment in the development of ports, road networks, internet access, or telephone services to facilitate trade.Though the primary objective is to increase participation on the world market, such investment is not specific to traded sectors but benefitsproducers throughout the economy. Unless there are proper legal policy guidelines in place to ensure that the private sector will recoup their investments in such activities; these kind of investments are done by national governments, sometimes with support from international organisations. An important characteristic of modern infrastructure is the fact that services are often supplied through a networked delivery system designed to serve a multitude of users (Agenor and Neanidis 2006). Therefore, trade-related infrastructure development will reduce

production costs, through reduction of transport and information costs. Better infrastructure and lower transport cost will first and foremost increase trade volumes, but will also increase total factor productivity. This is a direct impact ofTRCB on growth. De Mello (1997) noted that the adequacy of basic infrastructure affects the attractiveness of a country, thereby potentially increasingforeign direct Investment[53]. Therefore, if the government embarks on trade-related infrastructural development, the benefits will spill over to other sectors of the economy.TRCB policy target variables are typically non-rivalrous and partially non-excludable in nature, implying that the development of infrastructure, institutions and human capital to boost trade has spillover benefits to non-trade sectors of the economy and hence directlypromote overall growth.

Based on this assumed 'public good' character ofinvestments in TRCB, we therefore further assume that Government is committed to make the optimal use ofTRCB resources. Specifically, we suppose that there is deliberate public investment coordination that hinges upon the TRCB policy such that public services/policy (K_g) is equivalent to investments in TRCB (K_T). In Chapter 3 we saw that

$$X = f(K_T, \varphi)$$

where X is international bilateral trade flows as measured by exports, K_T is investment in TRCB and φ are other factors that affect international bilateral trade flows, as identified in the previous chapter, and

$$K_T = \omega(I, H, F)$$

where I, H and F are institutions, human capital and infrastructure variables as defined previously. Incorporating this relationship into the output equation as identified by Barro when public investment is included (see Equation 25)we will have the following:

Equation 34

$$Y = F(K, L, K_T)$$

Therefore the impact ofTRCB investments on output is through its impact on exports as shown in Chapter 3, such that $\frac{\delta Y}{\delta K_T} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta K_T}$. But TRCB consists of many different activities as highlighted in the overview ofTRCB, implying that the impact of K_T on output might be due to improvement in exports as a result of capacity development in human capital, institutions or infrastructureas follows:

$\frac{\delta Y}{\delta I} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta I}$: Partial impact of institutional capacity development

[53] This paper will not explore in detail the channels through which infrastructure impacts growth. See Fedderke (2005),

$\frac{\delta Y}{\delta H} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta H}$: Partial impact of capacity development of human capital.

$\frac{\delta Y}{\delta F} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta F}$: Partial impact of infrastructural development.

Furthermore, our empirical results show that it is not the partial impact ofTRCB initiatives that matters most, but the complementarities among TRCB activities. The results show that full benefits of capacity building on trade are realized when implementation of different policies is done in parallel, though not necessarily when *I*, *H*, and *F* are provided at a ratio of 1:1:1. In that case, we are interested in the following cross partial derivatives of the augmented production function:

$\frac{\delta^2 Y}{\delta I \delta H} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta I} \cdot \frac{\delta X}{\delta H}$: the rate of change of output with respect to improvement in trade-related institutions given that trade-related human capital also improves;

$\frac{\delta^2 Y}{\delta I \delta F} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta I} \cdot \frac{\delta X}{\delta F}$: the rate of change of output with respect to capacity improvement in trade-related institutions given that trade-related infrastructure also improves;

$\frac{\delta^2 Y}{\delta F \delta H} = \frac{\delta Y}{\delta X} \cdot \frac{\delta X}{\delta F} \cdot \frac{\delta X}{\delta H}$: the rate of change of output with respect to upgrading of trade-related infrastructure given that trade-related human capital also improves;

Where;

$$\frac{\delta^2 Y}{\delta I \delta H} = \frac{\delta^2 Y}{\delta H \delta I}; \frac{\delta^2 Y}{\delta F \delta I} = \frac{\delta^2 Y}{\delta I \delta F}; \frac{\delta^2 Y}{\delta F \delta H} = \frac{\delta^2 Y}{\delta H \delta F}$$

Given that our analysis in the previous chapter suggests that optimizing investment ofTRCB in sub-Saharan Africa could be achieved by building capacity in all areas in parallel as opposed to adopting a single policy option, we infer that;

$$\frac{\delta Y}{\delta I} < \frac{\delta^2 Y}{\delta I \delta H} \text{ or } \frac{\delta^2 Y}{\delta H \delta I}; \frac{\delta Y}{\delta H} < \frac{\delta^2 Y}{\delta H \delta F} \text{ or } \frac{\delta^2 Y}{\delta H \delta I} \text{ and } \frac{\delta Y}{\delta F} < \frac{\delta^2 Y}{\delta F \delta H} \text{ or } \frac{\delta^2 Y}{\delta H \delta F}$$

The intuition ofthis empirical findings is that while marginal effects are important it is the second order effect (complementarity) that is more important. These relationships are in line with the data, which reveal that Africa lags behind other regions in all TRCB target variables, implying that there is need to

build capacity in each. According to Lipsey and Lancaster (1956) adopting a piecemeal reform approach may reduce welfare if there are a large number of distortions, as is the case in SSA. Hence, the notion of policy complementarity is based on the proposition that lack of progress in one area affects growth – for example upgrading trade-related infrastructure is undermined in the absence of good institutions or human capital. Therefore complementary investment policies should result in higher output. Building capacity in one area increases the return from implementing improvement in another. Our findings suggest a broader capacity building programme which is comprehensive in nature.

4.2.4.1 *Proposed modification/extension of the standard growth model*

While either the Grossman and Helpman or Barro models could be extended to analyse the impact ofTRCB on growth, Barro's framework is preferred because its incorporation of a public sector into a simple constant-returns model of growth seems most appropriate for exploring the impact ofTRCB initiatives. TRCB initiatives are mainly implemented on the national level by government, through technical cooperation with foreign agencies or governments (as part of development aid). We make the following three major assumptions as a basis of our analysis; (i) Government is committed to make the optimal use ofTRCB resources (ii) there is a deliberate public investment coordination aimed at promoting trade through trade-related investment, such that public services/policy (K_g) is equivalent to investments in TRCB (K_T) and (iii) TRCB is an efficient form of development assistance (meaning that it should be supplying inputs of a type that a rational public sector would supply if it had the means).

Inclusion of trade-related investment introduces complexity to the existing endogenous model as extensions have to be added in the specification of the functional form of public investment. The Cobb-Douglas functional form adopted by Barro (1990) assumes that inputs are highly substitutable for each other and limits the substitution elasticities to unity; hence it allows room for input resources to be concentrated on cheaper investments at the expense of other forms of investment. Allowing for such substitutability contradicts the empirical findings of this thesis, which emphasise the importance of complementarity. Furthermore, the results show varying optimal complementarities across regions, with SSA countries benefiting more from complementing human capital and infrastructure while non-SSA countries derive their highest benefit from complementary institutional and infrastructural investments. In addition, data in this thesis show a wide variation between SSA and non-SSA average TRCB values and world standards. In such circumstances there is no reason to expect that the elasticity of substitution between different combinations ofTRCB variables will be same across regions. Therefore assuming elasticity of substitution to be unity is restrictive for TRCB analysis since we expect that the substitutability between two variables, e.g.*Handl*, is different from that between *H* and *F*.

In addition, the Barro model focuses on the overall size of government expenditure irrespective of composition. As such the framework does not allow an investigation into the optimal balance between different potential investment decisions by the government. However, our findings indicate that investment mixes among sub-components matter for TRCB effectiveness. Furthermore, we must recognize that the government can invest in either trade-related or non-trade related activities, and different mixes will have different consequences for trade and hence output. These insights coming from the empirical results are not limited to trade flows only but should also apply to a standard growth model. However, such complexities cause inconvenience to these standard theoretical models which represent only highly stylized general relationships. However, Davies and Weinstein argue that such inconveniencies for theories should not be ignored but should be embraced and understood. Arrow et al. (1961) and other researchers questioned the restrictive nature of the Cobb-Douglas model in assuming that all elasticities are equal to 1 and developed other flexible functions that allow substitution to be unrestricted (Berndt & Christensen 1973; Christensen et al. 1975; Deaton & Muellbauer 1980b; Deaton 1983; and Jorgensonand Fraumeni1983 among others). This, according to Guilkey and Lovell (1980:137) leaves separability, substitution and scale behaviour as hypotheses to be tested rather than maintained.

In the next paragraphs, we consider modifications to the model that can accommodate our estimation findings. The empirical evidence presented in Chapter 3 shows that the elasticity of substitution among the TRCB target variables is not one. If unity elasticity of substitution held then the degree of substitutability between inputs would not change regardless of the level of output or input proportions (Jehle & Reny 2001:122). This does not characterize the data analyzed in Chapter 3, which comes from countries at different levels of development, or our empirical findings, which imply different TRCB target variable elasticities. We therefore propose a flexible functional form that allows different substitution possibilities. In particular, we specify public investment using a constant elasticity of substitution (CES)-transcendental logarithmic (Translog) function as suggested by Polack, Sickles and Wales (1984). CES-Translog is a nested functional form that combines constant elasticity of substitution and transcendental logarithmic functional forms, and is therefore compatible with a wider range of substitution possibilities than either the CES or the translog individually (Polack, Sickles and Wales1984:602).

Taking the estimation equation for a CES-translog function proposed by Dewan and Min (1996) and changing the notation to be in line with that which we have used above, public trade-related investment will be characterized as follows.

Equation 35

$$\log K_g = \sigma_0 - \frac{1}{\rho}\log[\sigma_h H^{-\rho} + \sigma_f F^{-\rho} + (1-\sigma_h-\sigma_f)I^{-\rho}] + \omega_{hh}(\log H)^2 + \omega_{ff}(\log F)^2 + \omega_{ii}(\log I)^2 + \omega_{hf}(\log H)(\log F) + \omega_{hi}(\log H)(\log I) + \omega_{fi}(\log F)(\log I) + \varepsilon$$

where:

H, F and I are human capital, infrastructure and institutions.

K_g is the trade-related investment;

$0 \leq \sigma_h, \sigma_f \leq 1$;

$\rho = 1(1/\theta)$; that is, $\theta = 1/(1-\rho)$ where θ is the elasticity of substitution which lies between $0 and \infty$.

As $\rho \to -\infty, \theta \to 0$ *when* $\theta = 1, \rho = 0$ and when $\theta \to \infty, \rho \to +1$

CES, translog and Cobb-Douglas functions are all special cases under the CES-translog functional form[54].

The first order derivatives of the function are given by:

Equation 36

$$f_h = K_g \left[\frac{\sigma_h H^{-\rho-1}}{Z} + \frac{\omega_{hf}}{H} \log F + \frac{\omega_{hi}}{H} \log I + \frac{2\omega_{hh}}{H} \log H \right];$$

$$f_f = K_g \left[\frac{\sigma_f F^{-\rho-1}}{Z} + \frac{\omega_{hf}}{F} \log H + \frac{\omega_{fi}}{F} \log I + \frac{2\omega_{ff}}{F} \log F \right];$$

$$f_i = K_g \left[\frac{\sigma_i I^{-\rho-1}}{Z} + \frac{\omega_{hi}}{I} \log H + \frac{\omega_{hf}}{I} \log F + \frac{2\omega_{ii}}{I} \log I \right]$$

Adoption of such a functional form has implications for the steady-state values, depending on the values of ρ and the quadratic terms, which are cross partials between variables (capturing complementarity ofTRCB policy mixes). Given that our empirical analysis in the previous section shows that full benefits of capacity building are realized when different policies are implemented in parallel, there is no reason to assume that the quadratic terms will be negative or zero. As such the partial impact of trade-related investment will be enhanced. Implication of this conclusion is a higher steady-state growth rate as a result of a change on K_g. From Equation 33a we saw that:

$$\delta\gamma / \delta K_g = \frac{\phi}{K} \left[\delta Y / \delta K_g - \eta_{KT} \right] > 0$$

Adopting a specification that takes into account policy dynamics and assumptions regarding substitutability among TRCB investments will result in a higher $\delta Y / \delta K_g$ and hence a higher steady state growth ($\delta\gamma / \delta K_g$) than what the standard endogenous growth models would reveal.

[54] "In particular, when all the quadratic terms are zero we obtain the CES production function, while the translog production function is obtained in the limit as $\rho \to 0$" (Dewan and Min, 1996:8).

All of this means that there is need to find the optimum kinds and quantities ofTRCB activities. Therefore, the social planner needs to optimise investments in TRCB(K_T) by combining I, H, F in a particular manner, and to maximise K_T subject to the cost being equal to tax income revenue(T) as follows:

$$Max\ \mathrm{K_T}$$
$$\text{st } P_H H + P_I I + P_F F = T$$

Introducing this optimisation dimension in TRCB analysis gives insight into why TRCB may not bring about the anticipated growth. Once the optimisation problem is factored into the analysis, the steady-state growth rate becomes a function of the prices ofTRCB elements. It therefore means that, if one form ofTRCB is prohibitively expensive, the ability of the government to raise economic growth through TRCB investment may be curtailed because TRCB elements jointly matter in promoting trade flows and hence growth – but government cannot substitute the expensive elements for the cheaper ones.

4.3 CONCLUSION

The trade-growth theoretical framework needs to condition on trade policy dynamics. If there are no constraints on trade-related capacity building policies that could be adopted it is possible that the value of bilateral trade flows may be higher in the status quo without TRCB than under a TRCB programme, and growth will actually fall due to TRCB initiatives. For example, according to our findings, focusing all attention on the improvement of institutions alone will not result in increased trade flows, either in the region or in other non-SSA countries. Thus such investment resources would be wasted and we would expect this opportunity cost to be reflected in reduced growth. Our empirical findings substantiate the view that trade positively affects growth only if the right combination of trade-related capacity building policies is adopted. This therefore implies that if the optimal mix is not balanced, trade-related initiatives will not yield the maximum benefits. More worryingly, net benefits could be zero or negative.

This is potentially enlightening for debates on the value of openness, which have been characterized by disagreement regarding the overall impact of trade on growth. Given that Africa lags behind in all TRCB target variables, it is possible that ratios are not appropiately balanced. This might explain why in our regression results reported in the previous chapter the African dummy is consistently negative and significant. Bilateral trade flows in sub-Saharan African might be constrained by inappropriate combinations of trade-related and general private investment mixes.

Therefore, analyzing the impact of trade policy in general using the standard endogenous growth framework might underestimate the impact since policy dynamics are not addressed in the framework. This could the reason for the existence of ambiguities that have been noticed in the trade-

growth empirical literature. For example, a focus on primary exports might entail improvements in infrastructure at the expense of human capital and institutions, resulting in losing the complementarity necessary to attain higher growth.

In addition to incorporating policy complementarities, the standard growth model could be modified and/or extended to incorporate policy coordination. Although the issue of policy coordination is not tested in this thesis, it could also be that, by specifying particular investment targets, TRCB serves to coordinate investments across agencies, government departments and private agents; and this could provide an additional, or indeed even primary, channel by which it has positive impact on growth. Once TRCB initiatives are adopted trade becomes the focus as a tool for development; hence even non-trade related investment will switch to tradable products as the economy opens. In the debate on policy coordination, it is noted that public investment coordination centres on common policy and institutional frameworks among others. In the standard endogenous growth model policy coordination plays no role in determining the long-run growth rate of income.Hence the model is inadequate to fully analyze the impact ofTRCB.

CHAPTER 5

CONCLUSIONS, IMPLICATIONS FOR POLICY OPTIONS AND FUTURE RESEARCH

This thesis investigates the opportunity costs ofTRCB policy mixes in SSA. The research is motivated by the fact that development resources flowing to Africa are scarce; therefore, their allocation should be prioritized in such a way as to yield the greatest benefits. The thesis set out to find the optimal allocation ofTRCB resources and their opportunity costs in terms of trade flows and growth. Interview with trade experts in Geneva were done in conjunction with desk study of policy documents in the early phase of the thesis write-up to get a fair understanding ofTRCB programmes and economic rationales that fed into trade-related technical assistance and capacity-building policy. This was followed by an empirical analysis ofTRCB, whose main aim was to find out if the current focus ofTRCB is empirically justified. This was done through an estimation of the marginal effects of the three identified TRCB activities (human capital, infrastructure and institutions) as well as the impact oftheir complementary policy mixes.Policy simulation methodology was then used to test the responses of trade flows to different TRCB policy mixes. Lastly, the thesis further explores the standard trade and growth models, in particular their ability to provide an adequate framework for analysing the impact ofTRCB on growth. To be able to use these existing these standard trade and growth models I conclude by making some specification modifications proposals.

The interview work and desk study revealed many issues of interest to the optimal allocation ofTRCB resources. The preceding chapters shed light on the optimal balance of emphasis in TRCB policies as amongst infrastructure, institutional promotion and human capital development. However, the analysis shows lack of coherence in the implementation ofTRCB activities by bilateral and multilateral donors - no systematic implementation strategy or identification criteria seem to be in place to guide donors globally.

The main empirical findings are that each TRCB variables matter a lot but policy complementarities matter the most in trade-related capacity building initiatives - as such any effort aimed at fully understanding the overall impact ofTRCB on development should be modelled in a framework that takes into account these policy dynamics. In particular, empirical findings highlight the importance of taking cognizance of heterogeneity among regions in choosing TRCB policy mixes. Non-SSA countries benefit most from mixes of infrastructure and institutions, while countries in SSA derive maximum benefit from mixes of human capital and infrastructure. An implication of our findings is that universalism as an approach to development strategies, and in particular to TRCB, is problematic. If a universal approach to TRCB is adopted we are likely to see disappointing results across countries, as was the case with the outcomes of 'one size fits all' Structural Adjustment Programmes (SAPs) implemented in different regions and conditions of governance. Trade-related capacity building, while bearing much promise for sub-Saharan Africa, is unlikely to bring full benefits, and might even do harm, without the proper balance of investment targets. As such, the quest for growth in the region may remain elusive if the right policy mixes are not established.Based on the review ofTRCB activities

by different donors it is established that existing TRCB activities do not take into account the importance of identifying optimal complementarities. The design and implementation of these activities lackseconomic coherence.They are too broad in nature and there is also duplication among providersofTRCB activities.

Based on our empirical findings, an obvious future research challenge is to determine the optimal proportional reduction in distortions and capacity building needs. One of the reasons for failure of previous development programmes such as SAPs in Africa is the application of uniform development strategies across different countries. While this thesis gives insight into the importance of combining different policy mixes, it did not go further in establishing the optimal proportions for any given country. Therefore, future research may also contribute to this discussion by further investigating these optimal proportions of complementarities in different development circumstances.

In order to improve coordination among donors, further analysis could be done to evaluate which TRCB initiatives by different donors yield the greatest positive impacts on trade and growth. For example, is human capital development supported by ITC, which targets entrepreneurs, more effective than that underwritten by the WTO, which targets government officials? In addition to other methods that a researcher may employ, this can also be done using the analytical framework of this thesis, by estimating the gravity equation using individual components ofTRCB indices.

The cost implications ofTRCB policies need to be investigated against their anticipated benefits. Our analysis has been too simple in this respect, as we assumed equal costs regardless of the type of investment involved.

Findings in this thesis pose challenges to trade theorists to critically review standard trade and growth models with the aim of finding models that can provide an appropriate framework for analyzing dynamics surrounding trade policy. Trade-growth model reviewed in this thesis ignores the determinants of trade and take it to be exogenous. What we saw from the empirical findings is that the policy mixes matter; this therefore calls for more complicated models to analyse non-linear relationships that result from policy complementarities. Without the proper conceptual framework of analysis that recognises the dynamics necessary for TRCB to yield maximum results, estimated marginal effects ofTRCB initiatives will be quite low.

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APPENDIX

Appendix 1: Schedule of Interviews and Meetings Attended

Person	Organization	Position	Type of consultation	Venue	Date
Robert Teh (Jr.)	World Trade Organisation (WTO)	My Mentor during the internship at WTO	Consultative Meetings	Geneva WTO ✓ ✓ ✓ ✓ ✓	 09/03/2007 13/04/2007 08/05/2007 01/06/2007 15/06/2007
XXX	✓	JITAP	Interview	✓	
XXX	✓	TA Coordinator	Interview	✓	
XXX	✓	Aid for Trade	Interview	✓	
XXX	✓	Aid for Trade	Interview	✓	
XXX	ITC		Interview	Geneva ITC	07/05/2007
XXX	ECA Advisory Services		Interview	Geneva, UN	09/05/2007
XXX			Negotiating Group Trade Facilitation Meeting	Geneva, WTO ✓	12/03/2007 30/04/2007
XXX	UNIDO		Presentation - Trade & Development Seminar	✓ ✓	 19/02/2007
XXX	WTO/IMF		Economics Seminar	✓	01/06/2007
T. Mugadza	WTO	PhD Intern	Presentation of Thesis Proposal	✓	13/06/2007

Appendix 2: Semi-Structured Questionnaire Used as a Guide During Interviews With Key Trade Officials in Geneva, Switzerland

Thesis aim: To compare the *opportunity* costs (in terms of growth and trade flows) of various aspects of trade-related capacity building (TRCB) initiatives.

Objective of the Questionnaire: To get an understanding of the economic analysis that fed into trade-related technical assistance and capacity-building policy, that is, implicit and explicit rationales for specific details of trade capacity building programmes

Results of the Questionnaire: Responses to the interview will be used for background analysis ofTRCB and to motivate variables and identify proxies used in the model specification, for my PhD thesis.

Questions

- Challenge, lack of clear and measurable objectives and indicators in programming documents that have guided policy design and implementation.
- From my readings seem to understand that, needs identification (needs gaps) is done (diagnostic study of country needs, WTO operations divisions, Trade Policy Review Division); ***how are the TA activities prioritised, this not clear in the available documents. How do you decide on one particular TA activity instead of the other?***
- If TA is demand-driven as I seem to understand in the documents; ***how then do you optimise the use of resources, given that resources are limited?***
- Theoretical underpinning of the policy: ***Are there some studies (background papers) which were done before these TRCB programmes to give an economic justification. Are there some implicit economic model underlying policy targets. If so, which papers are they (accessibility of the documents)?***
- What is the justification ofTRCB activities in the policy literature produced by the responsible agencies and their consultants? How much support can these justifications find in economic theory and in academic analysis of past and present political economy?
- Type of data available. ***What kind of baseline data is available, baseline information (probably linked to needs assessment or not) e.g. no. of trade economists, trade lawyers, PhDs etc?*** (availability of such kind of information per country)
- What is the difference between current focus of TRTA/CB and previous similar initiatives that addressed these capacity constraints (human capital, institutions, and infrastructure)?
- Trade-related capacity building Vs Aid for Trade, where is the difference is it change of focus or what?
- For how long is the IF supposed to go?? Any discussions to that effect taking place?? Any major changes in the design foreseen; what guides policy changes ***–current negotiations?***

Other Issues

- Other resource persons to contact,
- Other relevant data sources

Appendix 3: List of Countries in the Sample

Albania
Algeria
Angola
Argentina
Armenia
Australia
Austria
Azerbaijan
Bangladesh
Belgium
Benin
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Canada
Chad
Chile
China
Colombia
Costa Rica
Croatia
Czech Republic
Denmark
Dominican Republic
East Timor
Ecuador
Egypt
El Salvador
Estonia
Ethiopia
Finland
France
Gambia
Georgia
Germany
Ghana
Greece
Guatemala
Guyana
Honduras
Hong Kong SAR
Hungary
Iceland
India
Indonesia
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Korea, Rep.
Kuwait
Kyrgyz Republic
Latvia
Lesotho
Lithuania
Macedonia, FYR
Madagascar
Malawi
Malaysia
Mali
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Morocco
Mozambique
Namibia
Netherlands
New Zealand
Nicaragua
Nigeria
Norway
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal
Romania
Russian Federation
Serbia and Montenegro
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Taiwan
Tajikistan
Tanzania
Thailand
Trinidad and Tobago
Tunisia
Turkey
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Venezuela
Vietnam
Zambia
Zimbabwe

Appendix 4. Memberships of Regional Trade Agreements

RTA	Members	RTA	Members
SSA	Angola; Botswana Lesotho, Malawi Mauritius, Mozambique Namibia; South Africa Tanzania; Zambia Zimbabwe	Common Market for East and Southern Africa (COMESA)	Angola, Burundi Eritrea Ethiopia Kenya, Lesotho Madagascar, Malawi Mauritius; Mozambique Namibia; Tanzania Uganda; Zambia Zimbabwe
Andean Community (AC)	Bolivia, Colombia Ecuador Peru and Venezuela	European Union (EU)	Austria, Belgium, Cyprus Czech Republic, Denmark Estonia, Finland, France Germany; Greece Hungary Ireland, Italy Latvia, Lithuania Luxembourg Malta, Netherlands Poland, Portugal, Romania Slovakia, Slovenia Spain Sweden; United Kingdom
Greater Arab Free Trade Area (GAFTA)	Bahrain; Egypt Jordan, Kuwait Morocco, Tunisia and United Arab Emirates	Southern Common Market (MERCOSUR)	Argentina, Brazil Paraguay and Uruguay
Association of South East Asian Nations (ASEAN)	Indonesia Malaysia Philippines Singapore Thailand Cambodia Vietnam	North America Free Trade Agreement (NAFTA)	Canada, Mexico and United States of America
Central American Common Market (CACAM)	Costa Rica El Salvador Guatemala Honduras Nicaragua	European Free Trade Association (EFTA)	Iceland Norway Switzerland
Caribbean Community and Common Market (CARICOM)	Guyana Jamaica Trinidad and Tobago	Commonwealth of Independent States (CIS)	Azerbaijan; Armenia Georgia, Moldova Kazakhstan; Russia Ukraine; Tajikistan and Kyrgyz
Central European Free Trade Agreement (CEFTA)	Albania Bosnia and Herzegovina Bulgaria; Croatia Czech Republic, Hungary Macedonia Moldova Poland; Slovak Serbia and Montenegro	South Asia Preferential Trade Agreement (SAPTA)	Bangladesh, India Sri Lanka and Pakistan
Economic Community of Western African States (ECOWAS)	Benin, Burkina Faso Gambia Ghana Mali Mauritania and Nigeria	Southern African Custom Union (SACU)	Botswana; Lesotho Namibia and South Africa

Appendix 5: Data Description

Variable	Description	Data Source
Exports	The value of total exports from country J to I	Commodity and Trade Database(COMTRADE) of the United Nations Statistics Division for trade data
Gross Domestic Product (GDP)_Exp	Exporting country's GDP in current U.S dollars	International Monetary Fund, World Economic Outlook Database, April 2007
Gross Domestic Product (GDP)_Imp	Importing country's GDP in current U.S. dollars	International Monetary Fund, World Economic Outlook Database, April 2007
Distance	Geographical distance between capital cities of country I and J	CEPII Distances Databases (dist_cepii)
Population	Total population of a country in millions	International Monetary Fund, World Economic Outlook Database, April 2007
Tariff	Is the weighted average tariff faced by exporter (where weights are given by the share of each trading partner in country j's total exports) specific to the trading partners i and j and year t	Trade Analysis and Information System (TRAINS) database of the United Nations Conference on Trade and Development(UNCTAD)
Trade-related human capital[55]	Is a composite index based on the aggregation of a number of sub-indicators	World Development Indicators & World Economic Forum, Global Competitiveness Report,(GCR)[56]
Trade-related infrastructure	Is a composite index based on the aggregation of a number of sub-indicators	World Economic Forum, Global Competitiveness Report,(GCR)
Trade-related institutions	Is a composite index based on the aggregation of a number of sub-indicators	World Economic Forum, Global Competitiveness Report,(GCR)& Doing Business Reports
Religion	This is the probability that two randomly drawn persons one from each country share the same religion	Central Intelligence Agency (CIA) The World Factbook
Regional Trade Agreement dummy	The dummy variable take the value of 1 if i and j belong to the same regional trade agreement and 0 otherwise	The World Trade Organisation (WTO)
Bilateral Trade Dummy	Takes a value of 1 if i and j have a bilateral trade agreement and 0 otherwise	The World Trade Organisation (WTO)
SSA Dummy	Takes a value of 1 if the exporting country belongs to the SSA region (excluding South Africa) and zero otherwise	http://www.countriesandcities.com/regions/sub-sahara-africa.htm
Land Locked dummy	The dummy takes the value of 1 if the exporting country is land locked and 0 otherwise;	CEPII Distances Databases (geo_cepii)
Border dummy	The dummy takes a value of 1 if country i and j share a land border and zero otherwise	CEPII Distances Databases (dist_cepii)
Common Language dummy	1 if country i and j share a common official language and zero otherwise	CEPII Distances Databases (dist_cepii)
Colonial dummy	Takes value of 1 if I and j have ever had a colonial link and 0 otherwise	CEPII Distances Databases (dist_cepii)

[55] The definitions of the trade-related variables (i.e. human capital, infrastructure and institutions) and the method adopted to construct them is described in detail on pages 20-22 of this thesis

[56] All survey data in GCR comes from the World Economic Forum's Executive Opinion Survey

Appendix 6: Averages of the Three Composite TRCB Indices per Income Group

		Non-SSA	SSA
High income: OECD	Infrastructure	1.384	
	Institutions	1.430	
	Human Capital	1.490	
High income: non-OECD	Infrastructure	1.226	
	Institutions	1.165	
	Human Capital	1.260	
Low income	Infrastructure	0.778	0.703
	Institutions	0.756	0.813
	Human Capital	0.720	0.645
Lower middle income	Infrastructure	0.881	0.739
	Institutions	0.855	0.752
	Human Capital	0.835	0.623
Upper middle income	Infrastructure	1.03	0.973
	Institutions	0.973	1.019
	Human Capital	1.069	0.842

Appendix6a: Average Levels ofTRCB Variables and Trade Flows

TRCB Category & Trade Flows	Sample mean	Std. Dev	Non-SSA Mean	Std. Dev	SSA mean	Std. Dev
Infrastructure	1		1.069	*0.262*	0.730	*0.149*
Human Capital	1		1.088	*0.317*	0.655	*0.104*
Institutions_importer	1		0.921	*0.278*	0.694	*0.100*
Institutions_exporter	1		1.050	*0.295*	0.814	*0.117*
Trade flows	6.63e+08	*5.54e+09*	1.03e+09	*6.93e+09*	3.05e+07	*4.08e+08*

Source: Authors calculations

Appendix 7: Justification forthe Use of Religion as a Selection Variable

Variable	Standard Gravity equation Dependant variable: logtrade	Probit equation Dependant variable: ptrade
Logtariff_imp	-0.538 (-10.03)	0.063 (1.20)
Logtariff_exp	-0.609 (-11.33)	0.073 (1.77)
Loggdp_imp	0.894 (53.51)	0.333 (26.45)
Loggdp_exp	1.221 (70.06)	0.332 (24.49)
Logpop_imp	0.153 (6.60)	-0.096 (-5.42)
Logpop_exp	0.136 (5.83)	-0.069 (-3.89)
logdist	-1.312 (-47.30)	-0.237 (-9.63)
Logrel	0.008 (-0.60)	0.067 (7.33)
dcomlang_otf	0.936 (13.91)	0.410 (7.48)
dlocked	-0.148 (-2.48)	-0.342 (-9.25)
dcolony	0.491 (3.07)	0.126 (-0.57)
dborder	1.123 (7.69)	-0.192 (-1.44))
_cons	19.722 (61.97)	1.194 (4.56)

Note: and denote significance at the 10, 5 and 1 percent level, respectively. Inside the parenthesis is z value

Appendix 8: Regression Using Individual Institutions Components

Variables	Rights 1	Contract 2	Standards 3	Financial 4	Documents 5	Research 6	Permits 7
logtariff_imp	-0.5***	-0.5***	-0.5***	-0.5***	-0.5***	-0.5***	-0.5***
	(-8.6)	(-9.0)	(-8.9)	(-8.0)	(-8.0)	(-8.6)	(-8.6)
logtariff_exp	-0.5***	-0.5***	-0.5***	-0.5***	-0.5***	-0.4***	-0.5***
	(-9.0)	(-9.4)	(-8.8)	(-9.2)	(-9.2)	(-8.4)	(-8.8)
logqdp_imp	0.7***	0.7***	0.7***	0.7***	0.7***	0.7***	0.7***
	(20.4)	(20.2)	(20.5)	(19.9)	(19.9)	(20.2)	(20.0)
logqdp_exp	0.6***	0.6***	0.6***	0.6***	0.6***	0.6***	0.6***
	(17.3)	(17.5)	(16.9)	(17.4)	(17.6)	(17.6)	(17.5)
logpop_imp	0.3***	0.3***	0.3***	0.3***	0.3***	0.3***	0.3***
	(10.1)	(9.6)	(9.5)	(9.9)	(10.1)	(9.8)	(9.95)
logpop_exp	0.6***	0.6***	0.6***	0.6***	0.6***	0.6***	0.6***
	(19.1)	(18.9)	(19.7)	(19.12)	(18.8)	(18.3)	(18.9)
logdist	-1.2***	-1.2***	-1.2***	-1.2***	-1.2***	-1.2***	-1.2***
	(-35)	(-35.7)	(-35.5)	(-34.7)	(-35.1)	(-35.4)	(-35)
loginat_imp	0.9***	-0.2**	-0.95***	0.3**	0.3***	-0.2	0.1
	(5.6)	(-2.1)	(-3.8)	(2.2)	(3.6)	(-1.1)	(1.95)
loginat_exp	-0.4***	-0.5**	1.4***	-0.02**	-0.2***	0.4***	0.001
	(2.6)	(-6.2)	(6.9)	(-0.2)	(-2.1)	2.53)	(0.03)
loghuman_imp	-0.7***	-0.4**	-0.3	-0.6***	-0.5***	-0.4**	0.6**
	(-3.6)	(2.4)	(-1.5)	(-3.2)	(-2.6)	(-2.1)	(-3.1)
loghuman_exp	1.3***	1.5***	0.9***	1.3***	1.3***	1.1***	1.3***
	(7.1)	(7.9)	(4.4)	(6.8)	(6.7)	(5.1)	(6.77)
logInfra_imp	1.5***	2.1***	2.6***	1.8***	1.9***	2.2***	2.0***
	(7.0)	(11.2)	(10.97)	(8.5)	(9.6)	(10.7)	(10.4)
logInfra_exp	3.0***	2.9***	1.7***	2.8***	2.8***	2.6***	2.7***
	(13.6)	(14.8)	(6.7)	(12.3)	(13.8)	(12.5)	(13.5)
dcomlang_off	0.9***	0.9***	0.9***	0.9***	0.9***	0.9***	0.8***
	(12.3)	(12.8)	(12.4)	(12.2)	(12.5)	(12.7)	(12.2)
dasa	-0.4***	-0.3***	-0.4***	-0.4***	-0.4***	-0.4***	-0.4***
	(-7.3)	(-5.6)	(-7.2)	(-7.1)	(-7.0)	(-6.9)	(-7.0)
dlocked	-0.01	0.02	-0.09	-0.02	-.01	-0.1	-0.001
	(-0.1)	(0.3)	(-1.5)	(-0.3)	(-0.6)	(-0.9)	(-0.0)
dcolony	0.6***	0.6***	0.6***	0.6***	0.6***	0.6***	0.6***
	(3.6)	(3.8)	(3.6)	(3.6)	(3.6)	(3.5)	(3.7)
dnorder	0.9***	0.8***	0.8***	0.8***	0.9***	0.8***	0.9***
	(5.8)	(5.7)	(5.8)	(5.7)	(5.8)	(5.7)	(5.8)
doc	1.8***	1.6**	1.7***	1.7***	1.7***	1.7***	1.7***
	(3.6)	(3.6)	(3.6)	(3.5)	(3.5)	(3.6)	(3.5)
dgatta	0.7	0.5	0.7	0.7	0.7***	0.7	0.7
	(1.4)	(1.1)	(1.4)	(1.4)	(1. 4)	(1.5)	(1.4)
daswan	1.6***	1.7***	1.6***	1.6**	1.6***	1.6***	1.6***
	(4.7)	(4.8)	(4.7)	(4.7)	(4.5)	(4.7)	(4.8)
dcacam	2.2***	2.3***	2.2***	2.2***	2.21***	2.3***	2.2***
	(4.3)	(4.4)	(4.3)	(4.2)	(4.2)	(4.3)	(4.3)
dcaricom	6.2***	6.4***	6.1***	6.2***	6.2***	6.2***	6.2***
	(7.0)	(7.3)	(6.99)	(7.0)	(7.3)	(7.1)	(6.99)
dcefta	0.9***	0.9***	0.9***	0.97***	0.9***	1.0***	0.9***
	(4.3)	(4.4)	(4.2)	(4.3)	(4.2)	(4.3)	(4.1)
decowas	0.9**	1.0**	0.9**	0.9**	0.9**	0.9**	0.9**
	(2.2)	(2.4)	(2.2)	(2.2)	(2.2)	(2.3)	(2.3)
dcomesa	1.0***	1.1***	1.0***	1.0***	1.0***	1.0***	1.0***
	(4.4)	(5.0)	(4.5)	(4.5)	(4.6)	(4.5)	(4.4)
deu	0.1	-0.1	-0.1	0.1	-0.1	-0.1	-0.08
	(-0.8)	(-0.8)	(0.8)	(-0.8)	(-0.7)	(-0.7)	(-0.7)
dmercosur	1.9***	1.8***	1.9***	1.9***	1.8***	1.9***	0.7***
	(3.08)	(2.8)	(3.0)	(2.97)	(3.0)	(3.1)	(1.8)
dnafta	-0.9	-0.8	-0.9	-1.0	0.9	-1.0	-1.0
	(-1.1)	(0.9)	(-1.0)	(-1.1)	(-1.1)	(-1.1)	(-1.1)
defta	0.9	1.2	0.96	0.9	0.9	0.9	1.0
	(1.1)	(1.3)	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)
dcis	2.3***	2.3***	2.3***	2.3***	2.3***	2.3***	2.2***
	(7.4)	(7.3)	(7.4)	(7.4)	(7.4)	(7.3)	(7.3)
dsapta	-0.1	-0.1	-0.1	-0.1	0.03	-0.03	-0.1
	(0.1)	(-0.1)	(-0.2)	(0.1)	(-0.05)	(-0.04)	(-0.1)
dbilateral	0.2***	0.2***	0.2***	0.2***	0.2**	0.2**	0.2**
	(2.3)	(2.6)	(2.5)	(2.4)	(2.5)	(2.5)	(2.5)
Mills lambda	-0.3	-0.2	0.2***	-0.2**	-0.3**	-0.2	-0.3
	(-1.5)	(-0.96)	(-1.2)	(-1.2)	(-1.8)	(-0.9)	(-2.0)

Number of obs	13074	13074	13074	13074	13074	13074	13074
Censored obs	2071	2071	2071	2071	2071	2071	2071

Note: *, ** and *** denote significance at the 10, 5 and 1 percent level, respectively; inside the parenthesis is z value

Appendix 9: Base Model with all TRCB Variables (Full Stata Results)

Heckman selection model -- two-step estimates (regression model with sample selection)

Number of obs	= 13074
Censored obs	= 2071
Uncensored obs	= 11003
Wald chi2(61)	= 14044.88
Prob > chi2	= 0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
logtrade						
logtariff~mp	-.4564516	.0530937	-8.60	0.000	-.5605134	-.3523898
logtariff~xp	-.4847147	.0536721	-9.03	0.000	-.5899101	-.3795194
loggdp_imp	.6771783	.0331444	20.43	0.000	.6122165	.7421401
loggdp_exp	.583431	.0329214	17.72	0.000	.5189062	.6479558
loginst_imp	.14056	.1729133	0.81	0.416	-.1983438	.4794637
loginst_exp	-.4915291	.1801419	-2.73	0.006	-.8446009	-.1384574
loghuman_imp	-.5662755	.1972608	-2.87	0.004	-.9528996	-.1796514
loghuman_exp	1.448122	.1926136	7.52	0.000	1.070607	1.825638
loginfra_imp	2.015343	.2008072	10.04	0.000	1.621768	2.408917
loginfra_exp	2.971382	.211424	14.05	0.000	2.556999	3.385765
logdist	-1.176889	.0333913	-35.25	0.000	-1.242335	-1.111443
logpop_imp	.2981838	.0309205	9.64	0.000	.2375807	.3587868
logpop_exp	.5815994	.0315123	18.46	0.000	.5198365	.6433623
dcomlang_off	.8937563	.0689996	12.95	0.000	.7585195	1.028993
dlocked	-.0182019	.0596772	-0.31	0.760	-.135167	.0987631
dcolony	.5486409	.1550156	3.54	0.000	.2448158	.8524659
dborder	.8388485	.1464333	5.73	0.000	.5518445	1.125853
dssa	-.3668062	.0594336	-6.17	0.000	-.483294	-.2503184
dac	1.676935	.4897668	3.42	0.001	.7170095	2.63686
dgafta	.677039	.4860477	1.39	0.164	-.275597	1.629675
dasean	1.669499	.3457729	4.83	0.000	.9917968	2.347202
dcacam	2.263267	.5188218	4.36	0.000	1.246394	3.280139
dcaricom	6.283899	.8797205	7.14	0.000	4.559679	8.00812
dcefta	.9657176	.2257484	4.28	0.000	.5232588	1.408176
decowas	.9525796	.3987508	2.39	0.017	.1710424	1.734117
dcomesa	1.043898	.2200816	4.74	0.000	.6125457	1.47525
deu	-.0889945	.120932	-0.74	0.462	-.3260168	.1480278
dmercosur	1.840771	.6305752	2.92	0.004	.6048668	3.076676
dnafta	-.9061584	.881025	-1.03	0.304	-2.632936	.8206189
defta	.9987898	.8769333	1.14	0.255	-.719968	2.717547
dcis	2.237656	.3093899	7.23	0.000	1.631263	2.844049
dsapta	.0122022	.6248321	0.02	0.984	-1.212446	1.236851
dsadcnsacu	.7817077	.4046351	1.93	0.053	-.0113625	1.574778
dsacu	.8940577	.7671212	1.17	0.244	-.6094723	2.397588
dbilateral	.2187829	.0881157	2.48	0.013	.0460793	.3914866
_cons	20.16221	.3689818	54.64	0.000	19.43902	20.8854
ptrade						
logtariff~mp	.1933312	.0445139	4.34	0.000	.1060855	.2805769
logtariff~xp	.2591238	.044199	5.86	0.000	.1724954	.3457522
loggdp_imp	.1933352	.0231277	8.36	0.000	.1480057	.2386647
loggdp_exp	.0411133	.0231063	1.78	0.075	-.0041742	.0864008
loginst_imp	1.401304	.1477164	9.49	0.000	1.111785	1.690823
loginst_exp	1.093724	.1456738	7.51	0.000	.8082085	1.379239
loghuman_imp	-.4349286	.1448682	-3.00	0.003	-.7188651	-.1509922
loghuman_exp	.4874783	.1425971	3.42	0.001	.2079931	.7669636
loginfra_imp	.219768	.1555585	1.41	0.158	-.085121	.5246571
loginfra_exp	.4934465	.1571782	3.14	0.002	.1853829	.8015101
logdist	-.152576	.0292012	-5.22	0.000	-.2098093	-.0953427
logpop_imp	.0196729	.0226343	0.87	0.385	-.0246894	.0640352
logpop_exp	.1435721	.0226272	6.35	0.000	.0992237	.1879206
logrel	.0971866	.0100099	9.71	0.000	.0775676	.1168057
dcomlang_off	.3302893	.0585291	5.64	0.000	.2155744	.4450043
dssa	-.4302258	.0424064	-10.15	0.000	-.5133408	-.3471107
dlocked	-.2845842	.0395125	-7.20	0.000	-.3620274	-.2071411
dcolony	.0095028	.2318337	0.04	0.967	-.4448829	.4638886
dborder	-.3410827	.1483603	-2.30	0.022	-.6318635	-.0503019
dac	5.102267	.	.	.	.	.
dgafta	4.019773	.	.	.	.	.
dasean	-.0777254	.3948204	-0.20	0.844	-.8515593	.6961084

dcacam	5.048952	.	.	.	.	.
dcaricom	5.184885	.	.	.	.	.
dcefta	1.097898	.3337203	3.29	0.001	.4438184	1.751978
decowas	.1366206	.220271	0.62	0.535	-.2951027	.5683439
dcomesa	.4805596	.1334484	3.60	0.000	.2190055	.7421137
deu	4.711216	.	.	.	.	.
dmercosur	5.186653	.	.	.	.	.
dnafta	2.482953	.	.	.	.	.
defta	3.350165	.	.	.	.	.
dcis	.0906758	.1956013	0.46	0.643	-.2926957	.4740473
dsapta	4.465767	.	.	.	.	.
dsadcnsacu	.7068568	.3355751	2.11	0.035	.0491418	1.364572
dsacu	-.5530236	.3984211	-1.39	0.165	-1.333915	.2278675
dbilateral	.3338469	.137309	2.43	0.015	.0647263	.6029675
_cons	1.144168	.3109563	3.68	0.000	.5347047	1.753631
mills						
lambda	-.1823425	.1668334	-1.09	0.274	-.50933	.1446451
rho	-0.08543					
sigma	2.1343054					
lambda	-.18234245	.1668334				

Appendix 10: Categorisation of United States Trade Capacity Building Assistance

TCB by Category ($US)	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Human Capacity Development						
WTO Awareness	8,250,253	9,518,213	8,389,916	6,297,984	6,857,445	4,714,130
WTO Accession	8,112,957	4,074,503	6,201,026	3,431,274	9,925,264	7,206,694
WTO Agreements (Sum of)	37,572,617	36,325,261	35,088,900	25,012,669	19,858,920	28,248,627
Agreements on Trade in Goods	2,653,722	1,039,694	671,330	380,349	998,975	837,500
Agreement on Agriculture	4,105,782	2,186,466	729,950	987,205	1,549,304	781,052
Agreement on SPS	6,788,308	9,857,862	6,995,360	7,246,468	8,725,989	10,409,348
Agreement on TBT	4,840,140	4,643,520	4,401,560	1,801,453	1,642,870	3,661,200
Agreement on TRIMs	1,956,048	330,000	220,070	165,291	10,000	525,000
Agreement on Anti-Dumping	32,770	703,562	103,680	202,462	30,000	175,000
Agreement on Customs Valuation Methods	3,462,136	3,974,680	6,651,130	3,014,549	1,000,506	574,000
Agreement on Rules of Origin	1,459,185	1,211,590	659,070	989,661	802,275	318,000
Agreement on Import Licensing Proc.	1,366,840	383,000	52,230	76,000	151,800	175,000
Agreement on CVMs	198,440	237,480	236,600	307,850	161,117	175,000
Agreement on Safeguards	108,400	664,562	149,750	275,027	101,117	175,000
General Agreement on Trade in Services	3,423,691	1,558,513	3,878,527	1,086,044	1,518,317	2,105,800
Agreement on TRIPs	3,558,952	6,215,359	7,027,824	4,708,533	1,526,357	6,429,308
Agreement on Disputes Settlement	258,942	736,100	1,568,210	745,216	378,975	537,000
Agreement on TPRM	1,508,041	485,000	252,920	219,220	15,000	898,347
Agreement on Gov't Procurement	1,851,219	1,993,873	1,480,000	2,029,473	696,317	297,071
Other WTO Agreements		104,000	10,689	777,868	550,000	175,000
Human Resources & Labor Standards	132,074,621	99,664,527	115,292,905	138,396,841	87,695,235	95,393,486
Trade-Related Agriculture	41,628,190	84,002,132	104,494,091	114,906,661	164,235,937	132,672,683
Tourism Sector Development	6,051,892	20,989,283	10,623,252	19,126,614	21,882,684	10,763,884

Other Services Development	21,897,831	23,619,182	6,373,076	6,370,782	4,385,429	1,649,733
Business Services & Training		74,482,426	76,102,461	94,645,233	154,082,156	86,637,788
Regional Trade Agreements (RTA)		9,449,448	29,262,861	32,741,228	28,684,386	14,362,701
Sub-Total	***255,588,361***	***362,124,975***	***391,828,488***	***440,929,286***	***497,607,456***	***381,649,726***
Institutional Development						
Trade Facilitation (sum of)	0	61,219,753	91,499,706	127,807,565	143,145,009	193,979,825
Customs Operation & Administration		19,900,167	21,505,858	31,801,583	17,004,953	67,457,827
Export Promotion		30,992,468	67,413,517	87,250,531	98,082,827	93,185,225
Other Trade Facilitation		10,327,118	2,580,331	8,755,451	28,057,229	33,336,773
Financial Sector Dev. & Good Governance	63,332,344	68,850,959	88,730,327	86,135,648	167,683,650	87,814,732
Environmental Trade & Standards	34,465,246	19,310,946	28,903,590	29,220,906	29,484,153	63,362,888
Competition Policy & Foreign Investment	37,038,793	28,667,469	23,901,142	22,824,831	27,480,569	29,440,889
Gov/Transparency & Inter-Agency Coord.	46,158,928	33,358,407	41,907,784	49,383,743	38,313,639	50,120,631
Other TCB	7,576,435	22,266,038	21,839,261	22,125,464	52,775,117	65,219,114
Sub-Total	***188,571,746***	***233,673,572***	***296,781,810***	***337,498,157***	***458,882,137***	***489,938,079***
Infrastructure Development						
Physical Infrastructure Development	43,251,493	19,401,099	44,063,581	119,723,023	346,297,431	549,796,466
E-Commerce & IT		22,635,501	27,446,566	23,009,965	42,466,015	14,594,579
Sub-Total	***43,251,493***	***42,036,600***	***71,510,147***	***142,732,988***	***388,763,446***	***564,391,045***
Grand Total TRCB	**487,411,60**	**637,835,147**	**760,120,445**	**921,160,431**	**1,345,253,039**	**1,435,978,850**

Source: U.S. Trade Capacity Building Database www.usaid.gov, keyword: TCB Database: (*grouping of activities done by the author*).